

MACHINE SERVICE BULLETIN #40

SUBJECT: K "1-AA" & "2-AA" MACHINES

DATE: January 15, 1927

TO ALL OFFICES:

We are releasing herewith an illustrated Service Bulletin that covers the mechanism of the K "1-AA" & K "2-AA" Full Automatic Machines.

In preparing this bulletin and illustrating it, we have used the same methods that were used in preparing Machine Service Bulletins #24 and #34, resulting in placing in the hands of our servicemen complete information covering the operations of dismantling, reassembling and adjusting these series of our K model machine in detail. This bulletin is also indexed so that any part of the mechanism may be referred to very quickly. We have also included timing charts that clearly show the function of this mechanism. (Refer to Plates 17 to 21 inclusive on the Automatic Division mechanism and 30 to 35 inclusive on the Multiplier mechanism.)

The information contained in this bulletin together with that contained in Bulletin #24 and its supplements A, B and C and Bulletin #34, places in your hands complete information as to how to properly service all K Model Monroe Calculating Machines.

We have also included an illustrated parts list, Plates 36 to 46 inclusive. This together with a temporary parts and assembly list, pages 1 to 9 inclusive, completes this information so that all of the various parts and assemblies are illustrated and numbered. The list supplies you with their description which will permit the ordering of whatever material is needed, under its correct part and assembly numbers.

To eliminate as much confusion in the field as possible with the release of the "1-AA" and "2-AA" series K model machines, we have extended ourselves considerably so that our service personnel in the field might have the information contained herein before the release of these machines. Therefore, its contents must be thoroughly studied by our servicemen so that when they receive these machines they will know how to properly service them.

Do not make the mistake of putting off this important matter. Your complete co-operation is requested. We have done our utmost to help you in this work and it is now up to you to do your part by thoroughly studying this bulletin and taking full advantage of the information it contains.

Every District receiving this bulletin is held responsible for it and we request acknowledgment on the enclosed receipt card which is to be forwarded to this office without delay.



General Service Manager.

FMS:LJJ

# INDEX - KAA

PAGE ONE

PLATE NUMBERS WILL BE FOUND IN UPPER R.H.CORNER.  
LOCATIONS OF DEFINATE OPERATIONS-DISMANTLING-ASSEMBLY: ARE SHOWN THIS <sup>OPER</sup> ~~OPER~~

<b>CARRIAGE</b>	<b>DISMANTLING</b> ADJUSTMENT-ASSEMBLY REPAIR PARTS	750 PL. #1 PLATE #1 GROUP #52 PL. #37
<b>KEY BOARD AND CONNECTIONS</b>	<b>DISMANTLING</b> ADJUSTMENT-ASSEMBLY REPAIR PARTS	710 711 712 PL. #3 PL. #3-#4 GROUP #50 PL. #36
<b>CARRYING SHAFT.</b>	<b>ASSEMBLY</b> REPAIR PARTS	PLATE #37 GROUP #51 PL. #37

<b>L.H. SIDE FRAMES [STOPPING CYCLE]</b>	<b>DISMANTLING</b> ADJUSTMENT AND ASSEMBLY FUNCTION LAYOUTS REPAIR PARTS	805 806 807 808 809 810 811 812 813 814 PL. #9 852 853 854 PL. #12 861 862 863 864 865 PL. #15 PLATE #20-21-22-23 866 GR.53 GR.55 GROUP #56 GROUP #57 PL. 37 PL. 38 PL. 39 PL. 40
<b>[DRIVING PARTS]</b>	<b>DISMANTLING</b> ADJUSTMENT-ASSEMBLY FUNCTION LAYOUTS REPAIR PARTS	805 806 807 808 809 810 811 812 813 814 PL. #9 858 859 PL. #13 PLATE #20-18-23 GROUP #57 PL. #40
<b>[DIVISION PARTS]</b>	<b>DISMANTLING</b> ADJUSTMENT-ASSEMBLY FUNCTION LAYOUTS REPAIR PARTS	800 801 802 803 804 PL. #8 855 856 857 PL. #13 860 861 PL. #14 PLATE #17-18-22-23 GROUP #57-58 PL. #40 AND 41

## INDEX-KAA

PAGE TWO

<p><b>L.H. SIDE FRAME CONTINUED</b>  <b>CARRIAGE SHIFT PARTS</b>  <b>DISMANTLING</b>  <b>ADJUSTMENT-ASSEMBLY</b>  <b>FUNCTION LAYOUTS</b>  <b>REPAIR PARTS.</b></p>	<p>776 777 778 779 #  780 781 PL. 5  787 788 789 PL. 7  867 868 869 #  870 871 PL. 15  872 873 874 #  875 876 PL. 6  873 874  875 876  PL. 16</p> <p>GROUP #59 PL. #41  GROUP #60 PL. #42</p>
<p><b>INSIDE OF L.H. SIDE FRAME</b>  <b>DISMANTLING</b>  <b>ADJUSTMENT-ASSEMBLY</b>  <b>FUNCTION LAYOUTS</b>  <b>REPAIR PARTS</b></p>	<p>820 821 822 823 PL. 11  850 851 PL. #11 AND 12  PLATE #19  GROUP #61 PL. #40</p>
<p><b>COVER CASE</b>  <b>DISMANTLING</b>  <b>ASSEMBLY</b>  <b>REPAIR PARTS</b></p>	<p>751 752 753 PL. 1 #  754 755 757 759 PL. 2 #  760 761  PL. 38  GROUP #54 PL. #38</p>

<p><b>MULTIPLIER UNIT.</b>  <b>DISMANTLING</b>  <b>ADJUSTMENT</b>  <b>ASSEMBLY</b>  <b>FUNCTION LAYOUTS</b>  <b>REPAIR PARTS</b></p>	<p>900 901 902 PL. #24  903 904 905  762 763 764 PL. 3 #  906 907 908 PL. 25 #  909 910 911 PLATE 26  925 926 927 928 PL. 27 #  929 930 931 932 PL. 28 #  933 934  PLATE #35  PLATE 29-30-31-32-33-34  PLATE #43-44-45-46</p>
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PLATE 1

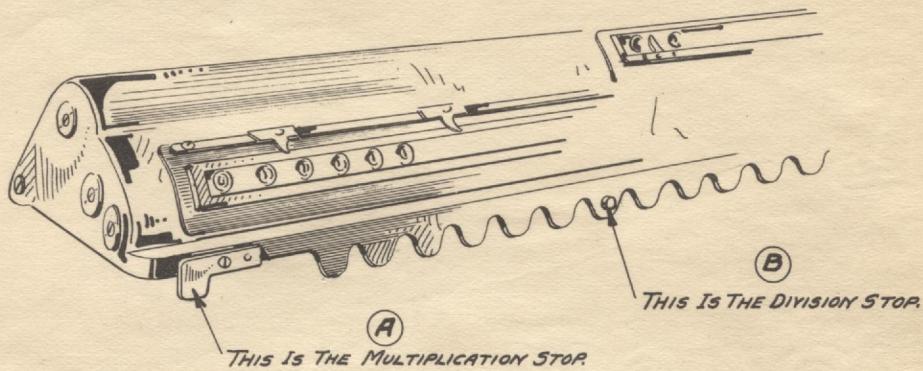
## HOW TO DISMANTLE, ADJUST AND ASSEMBLE THE KAA MODELS

FULL AUTOMATIC MACHINES

NOTE - OPERATION AND LOCATION NUMBERS

(OPER. #) BEGIN WITH #750

750 REMOVE CARRIAGE. SEE PLATE NO 1 SERVICE BULLETIN #34 OPER. ① ② ③ ④



NOTE - THE CARRIAGES USED ON THE KAA MACHINES DIFFER ONLY IN THAT TWO STOPS A B ARE ATTACHED AS SHOWN. OTHERWISE SAME AS REGULAR.

751 REMOVE SCREWS E AND REMOVE KNOB FROM SHAFT.

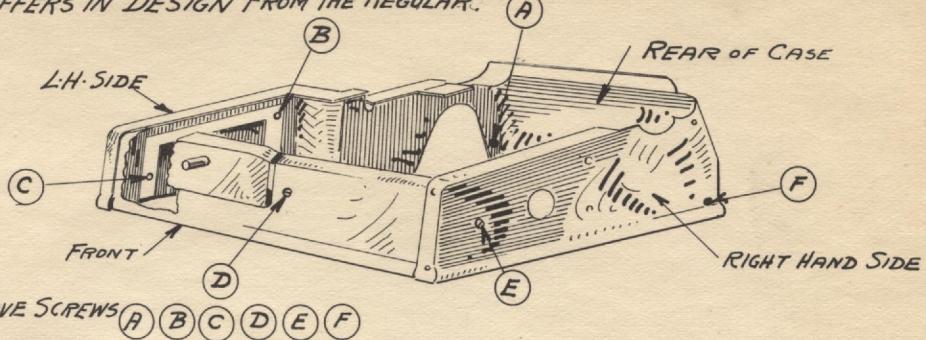
752 PRESS LATCH C IN DIRECTION OF ARROW AND PULL OUT THE CRANK HOLE COVER D

753 AUTOMATIC MACHINES ARE SUPPLIED WITH A CRANK FOR USE IN EMERGENCY CASES. IT IS REMOVED LIKE THE COVER.

PLATE 2

NOTES ON DISMANTLING THE BASE OF THE KAA MACHINES

754 THE COVER CASE OF THE KAA MACHINES IS OF SECTIONAL CONSTRUCTION AND DIFFERS IN DESIGN FROM THE REGULAR.

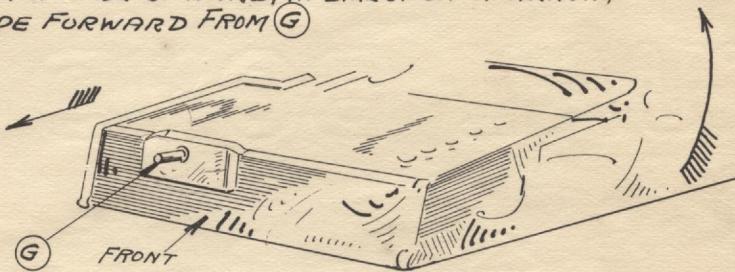


755

REMOVE SCREWS (A) (B) (C) (D) (E) (F)

757

LIFT REAR OF CASE UPWARD, IN DIRECTION OF ARROW, AND SLIDE FORWARD FROM (G)



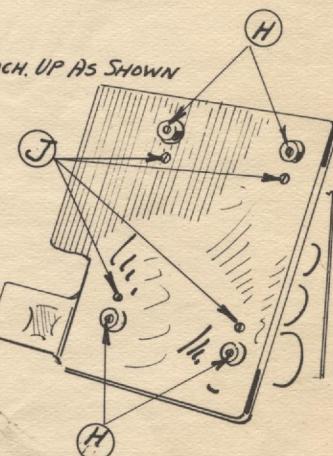
759 REMOVE 4 SCREWS (J) AND 4 RUBBER FEET (H)  
USE LARGE SCREW DRIVER #4.

760

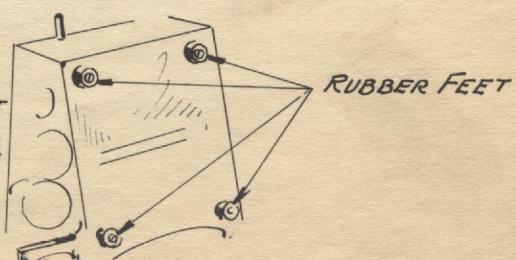
REMOVE PAN AND LAY ASIDE  
WITH SCREWS (J)



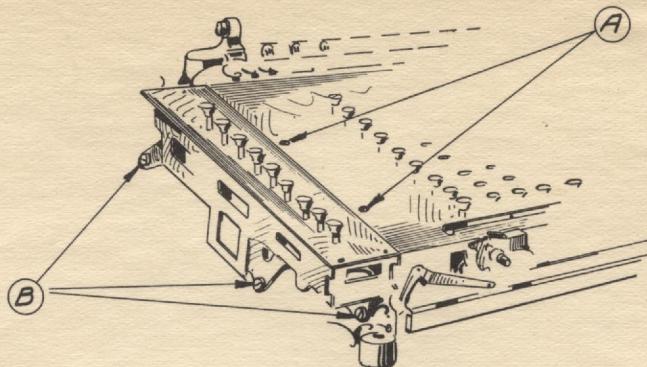
STAND MACH. UP AS SHOWN



761 IT'S GOOD PRACTICE TO FASTEN THE RUBBER FEET AGAIN TO THE BASE OF THE MACH. THIS GIVES FOOTING, PREVENTS MARKING OF BENCH AND MAKES IT EASIER TO OPERATE THE CRANK.



## NOTE-ON DISMANTLING THE KAA MACHINES.



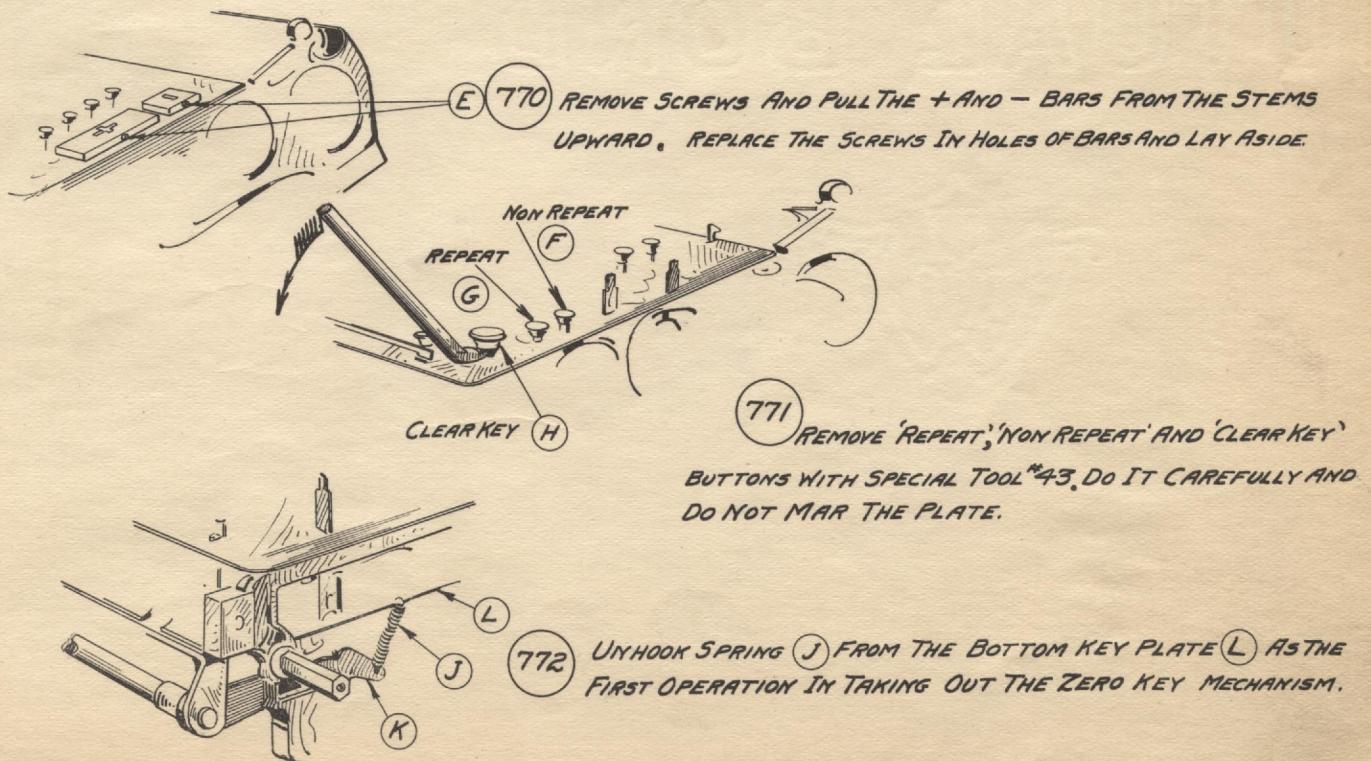
762 REMOVE THE SCREWS (A) FROM KEYBOARD PLATE AND LAY ASIDE.

763 REMOVE THE SCREWS (B) FROM THE STUDS IN L.H. SIDE FRAME.

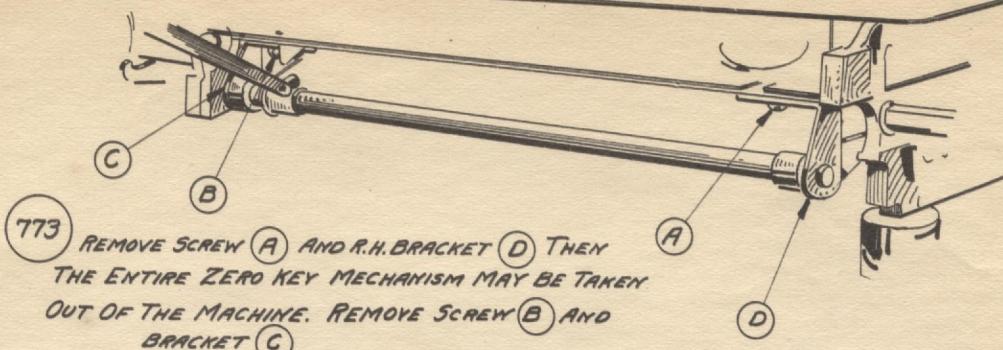
764 CAREFULLY EXTRACT THE MULTIPLIER AS A UNIT FROM THE BODY OF THE MACHINE AND LAY IT UPON ITS LEFT SIDE OUT OF THE WAY OF INJURY.

NOTE- FOR FURTHER OPERATIONS UPON THE MULTIPLIER  
SEE PLATES. 24-25-26-27-28-29-30-31-32-33-34-35

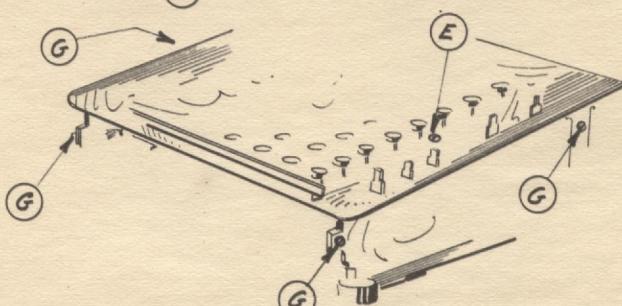
## NOTES ON REMOVING THE KEYBOARD OF KAA MACHINES.



## NOTES ON DISMANTLING THE KEYBOARD OF KAA MACHINE.



773 REMOVE SCREW (A) AND R.H. BRACKET (D) THEN THE ENTIRE ZERO KEY MECHANISM MAY BE TAKEN OUT OF THE MACHINE. REMOVE SCREW (B) AND BRACKET (C)



774 REMOVE SCREW (E) ON PLATE OF KEYBOARD AS SHOWN. REMOVE 4 SCREWS (G) FROM SIDE FRAME.

775 LIFT OFF THE KEYBOARD AS A UNIT - AND LAY CAREFULLY ASIDE.

## - NOTE -

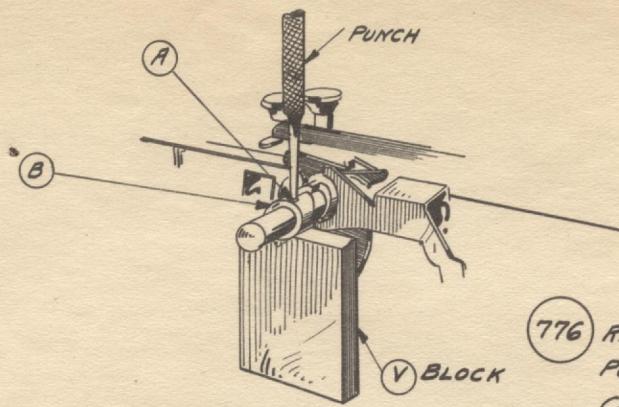
THE KAA KEYBOARD DIFFERS FROM THE REGULAR KEYBOARD AS NOTED BELOW.

PARTS THAT REMAIN THE SAME	PARTS THAT HAVE BEEN CHANGED	PARTS THAT HAVE BEEN ADDED	REMARKS
NO. 1 KAA SERIES	NO. 1. KAA SERIES	NO. 1 AND 2 KAA SERIES	
K-105	K-180	1320	
K-107	K-181	1331	
K-108 <sup>1 to 9</sup>	K-182	12-50	
K-109 D	K-190 <sup>1 to 9</sup>		
K-110	K-191 <sup>1 to 9</sup>		
K-118	K-192 D		
K-124	K-194		
K-125 $\frac{1}{2}$	K-647		
K-126 $\frac{1}{2}$			
K-127			
K-139			
K-154			
K-164			
ASSEMBLIES			
K-1-11 $\frac{1}{2}$			
K-1-12			
K-1-13			
NO. 2 KAA SERIES.			
K-826			
AND ALL PARTS ABOVE.			

K-115  $\frac{1}{2}$  CAN BE CHANGED TO 1215  $\frac{1}{2}$  BY REMOVING LUG X SHOWN BELOW.

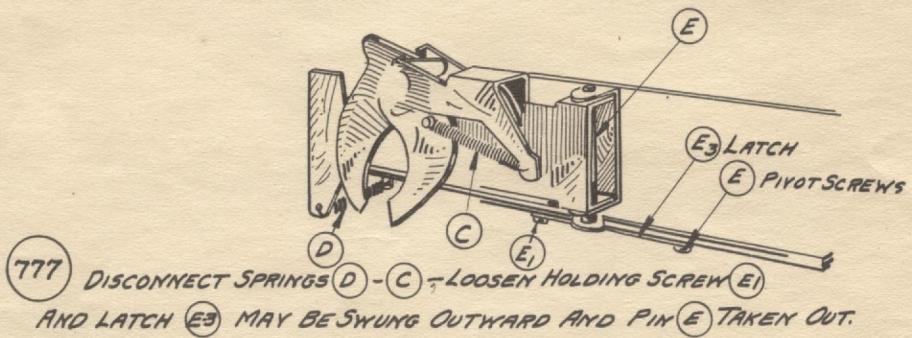


PLATE 5  
NOTES ON REMOVING THE AUTOMATIC CARRIAGE SHIFT MECHANISM



776 REMOVE THE TAPER PIN (A) WITH THE PROPER PUNCH AND REMOVE THE MULTIPLIER CAM CLUTCH (B)

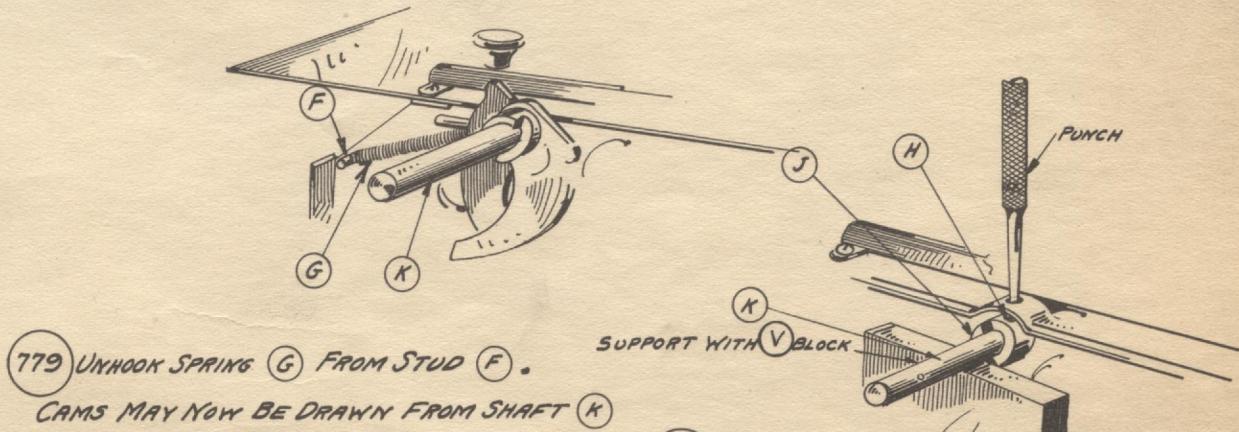
USE (V) BLOCK AND SUPPORT THE SHAFT PROPERLY.



777 DISCONNECT SPRINGS (D) - (C), LOOSEN HOLDING SCREW (E1) AND LATCH (E3) MAY BE SWUNG OUTWARD AND PIN (E) TAKEN OUT.



778 REMOVE THE CAM SHIFTER BOILY OUT OF THE MACHINE.



779 UNHOOK SPRING (G) FROM STUD (F).

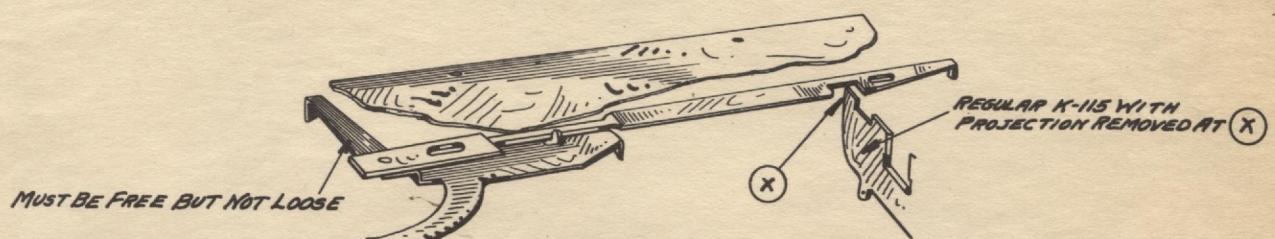
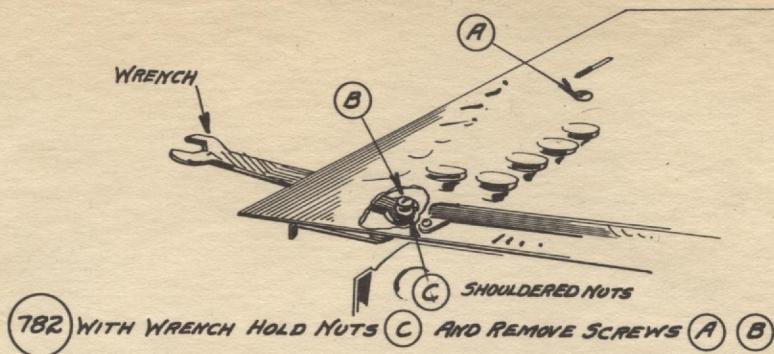
CAMS MAY NOW BE DRAWN FROM SHAFT (K)

780 INSERT PUNCH THROUGH HOLE IN TOP OF KEYBOARD PLATE AND PUNCH OUT TAPER PIN (H) AND REMOVE CLUTCH CAM (J) FROM SHAFT (K).

781 SHIFTER ROD MAY NOW BE WITHDRAWN.

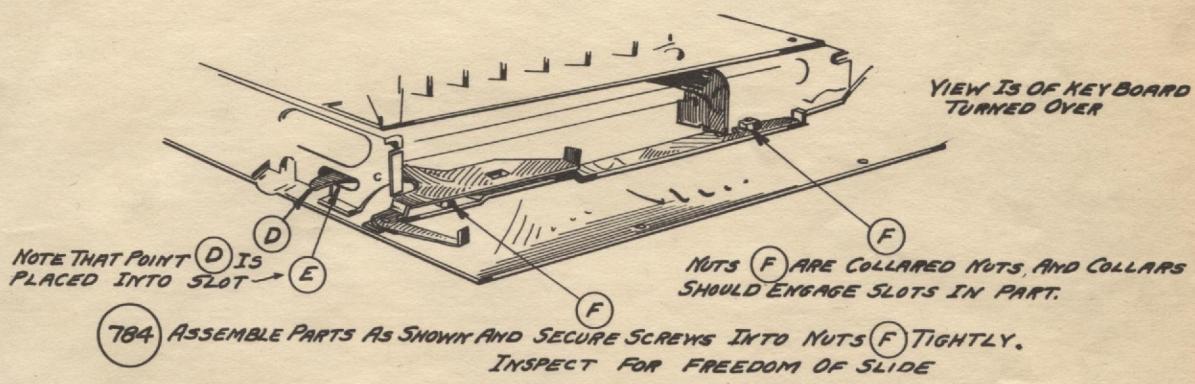
NOTES ON DISMANTLING THE KEY BOARD.

PLATE 6



783 REMOVE PARTS AS A WHOLE - INSPECT FOR STRAIGHTNESS AND LOOSENESS BEFORE REASSEMBLY

NOTES ON REASSEMBLING THE KEYBOARD.



785

INSERT THE CARRIAGE SHIFT (R)  
AFTER INSPECTION FOR STRAIGHTNESS

786

PLACE CLUTCH CAM (J) ON SHIFT ROD  
INSERT TAPER PIN (H) THROUGH HOLE IN TOP PLATE AT (G)  
SET PIN PROPERLY WITH PUNCH NO 30, USING A (V) BLOCK FOR SUPPORT.

INSPECT SHIFT ROD FOR FREEDOM OF MOVEMENT  
AND TIGHTNESS OF PINS.

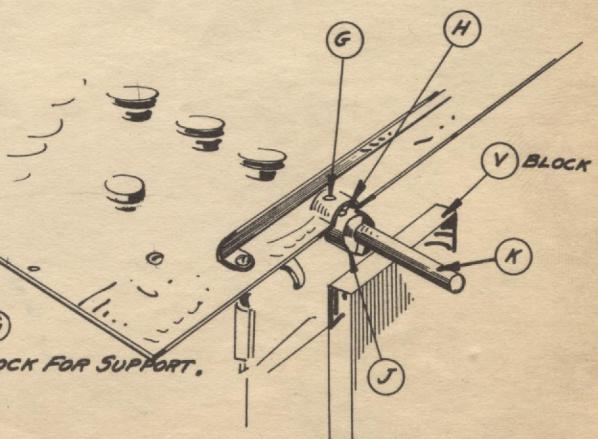
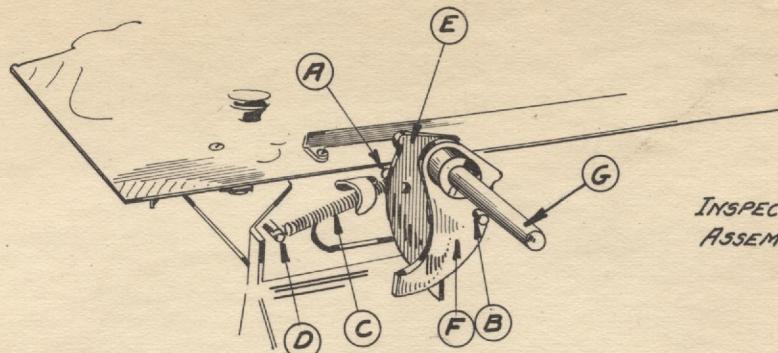
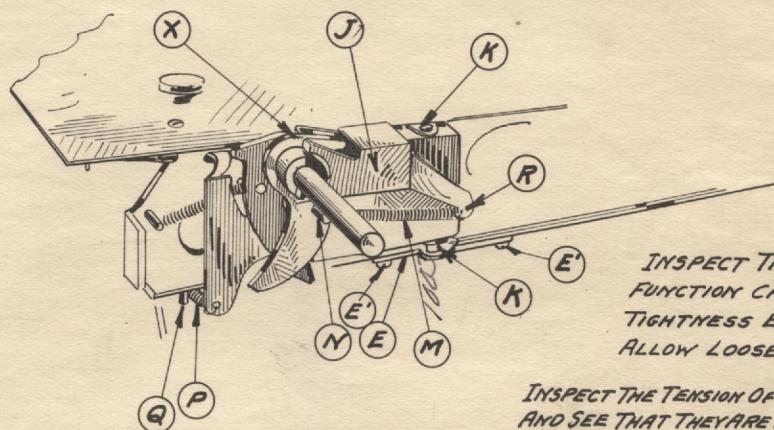


PLATE 7  
NOTES ON THE ADJUSTMENT AND REASSEMBLY OF THE KEYBOARD PARTS.



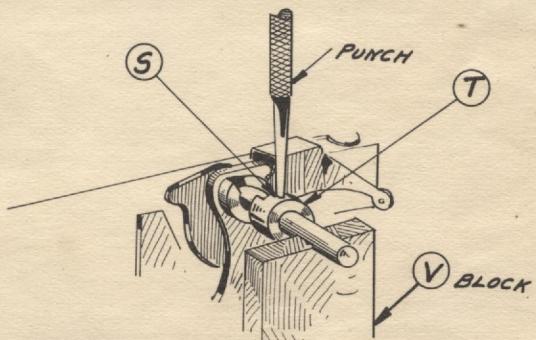
INSPECT THESE CAMS WHEN ASSEMBLED, FOR FREEDOM.

787 ASSEMBLE CAMS (E) (F) UPON SHAFT (G) THESE CAMS ARE ALIKE. HOOK UP SPRING (C) TO PIN (D).



INSPECT THESE PARTS AND THEIR FUNCTION CAREFULLY. SEE THAT NO TIGHTNESS EXISTS AT (X), BUT DO NOT ALLOW LOOSENESS EITHER.

788 ASSEMBLE PART (J) AS SHOWN. - INSERT PIN (K) FROM BELOW AND SWING LATCH (E) IN PLACE AND TIGHTEN SCREWS (J). HOOK UP SPRING (M) FROM POINT (R) TO PIN (N) ALSO SPRING (P) TO PIN (Q).

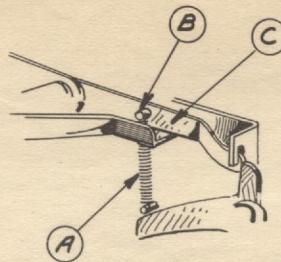


789 ASSEMBLE PART (T) UPON THE SHIFT SHAFT. BE SURE TO LINE UP THE TAPER HOLES BEFORE DRIVING THE PIN (S) HOME. USE THE PROPER PUNCH AND SUPPORT SHAFT WITH A (V) BLOCK.

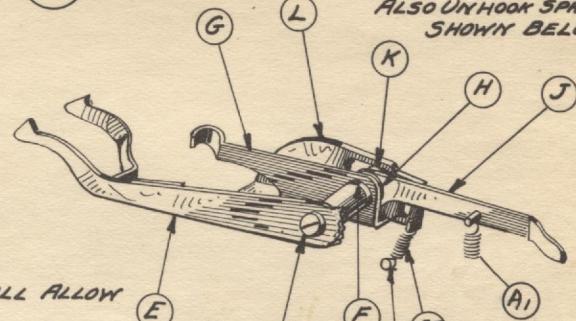
THE KEYBOARD HAS BEEN REASSEMBLED AND MAY BE LAID ASIDE.  
FOR NOTES AS TO FUNCTION OF THE PARTS; SEE PLATE 19.

NOTES ON REASSEMBLING THE KEYBOARD WILL BE FOUND ON PLATE 16.

PLATE 8  
NOTES ON DISMANTLING THE AUTOMATIC AND DIVISION MECHANISM  
FROM THE LEFT HAND SIDE FRAME.

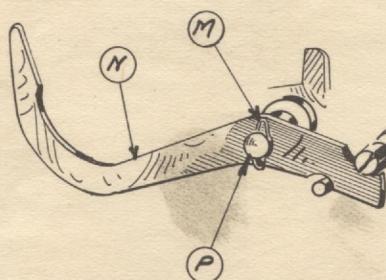


800 UNHOOK SPRING (A) FROM PIN (B) IN TRIPLE LEVER (C)  
ALSO UNHOOK SPRING (AA) FROM STUD (BB) SHOWIN BELOW

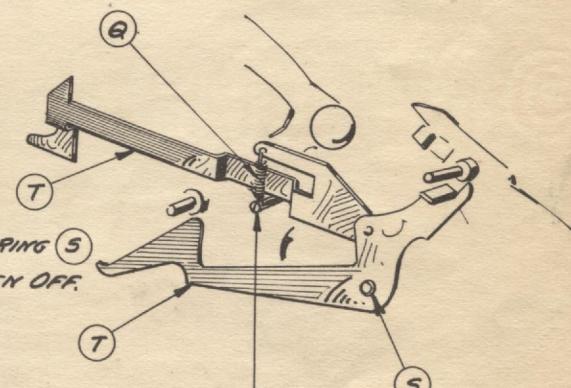


801 THE REMOVAL OF SCREW (D) WILL ALLOW  
THE TAKING OF THIS GROUP OFF AS A WHOLE.

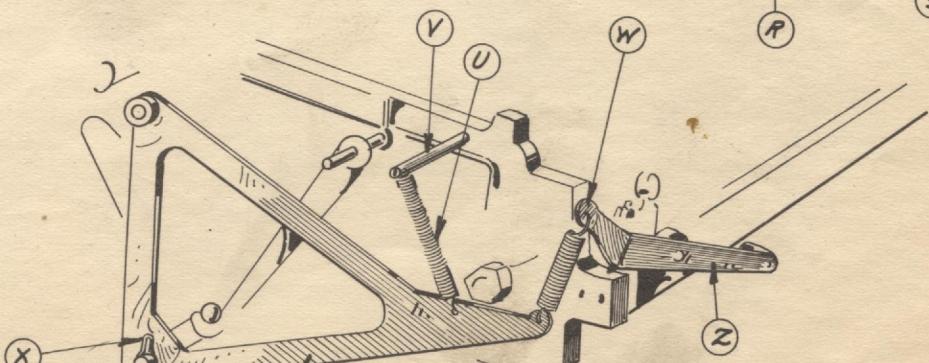
THIS ASSEMBLY CONSISTS OF TRIP LEVER (E), COLLAR (F), LEVER (G), WASHER (H), LEVER (J), COLLAR (K)  
AND LEVER (L) SPRINGS (A) AND (AA).



802 REMOVE CLIP (M) AND PART (N) MAY BE LIFTED FROM STUD (P)

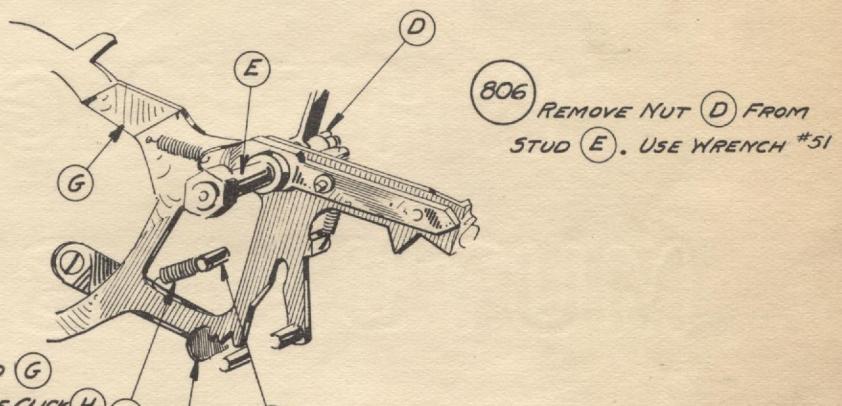
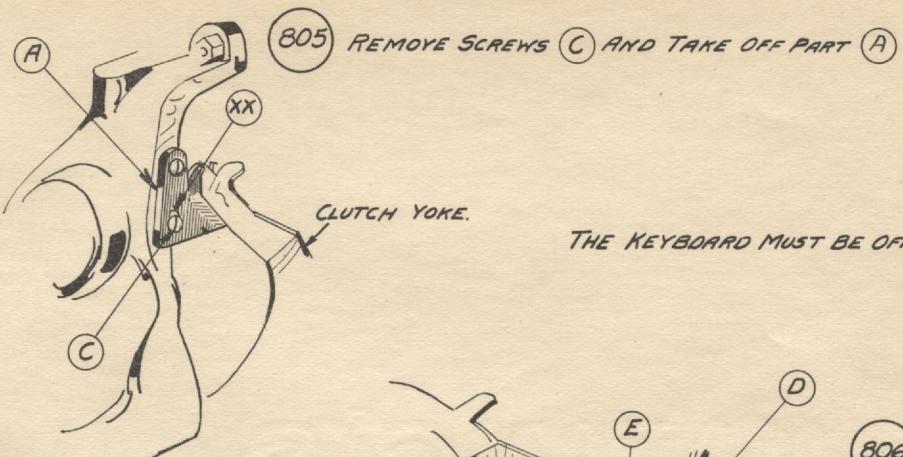


803 UNHOOK SPRING (Q) FROM PIN (R). REMOVE RING (S)  
FROM STUD (S). PART (T) MAY THEN BE TAKEN OFF.



804 REMOVE CLIP (X) AND UNHOOK SPRING (U) FROM PIN (V). ALSO UNHOOK SPRING (W) FROM PART (Z).  
PART (Y) MAY NOW BE TAKEN OFF STUD (XX).

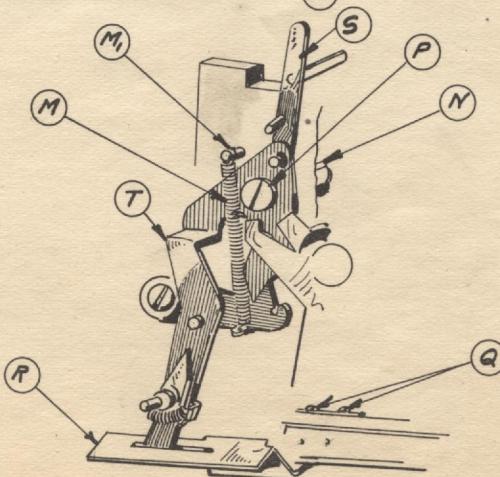
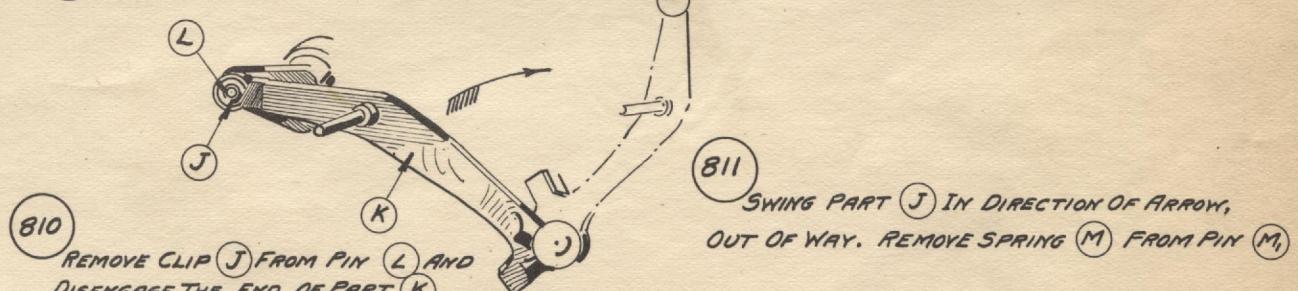
## NOTES ON DISMANTLING THE L.H. SIDE FRAME.



807 REMOVE STUD (E) FROM THE SIDE FRAME, USE WRENCH

808 UNHOOK SPRING (F) FROM STUD (G)  
THIS WILL TAKE THE TENSION OFF CLICK (H)

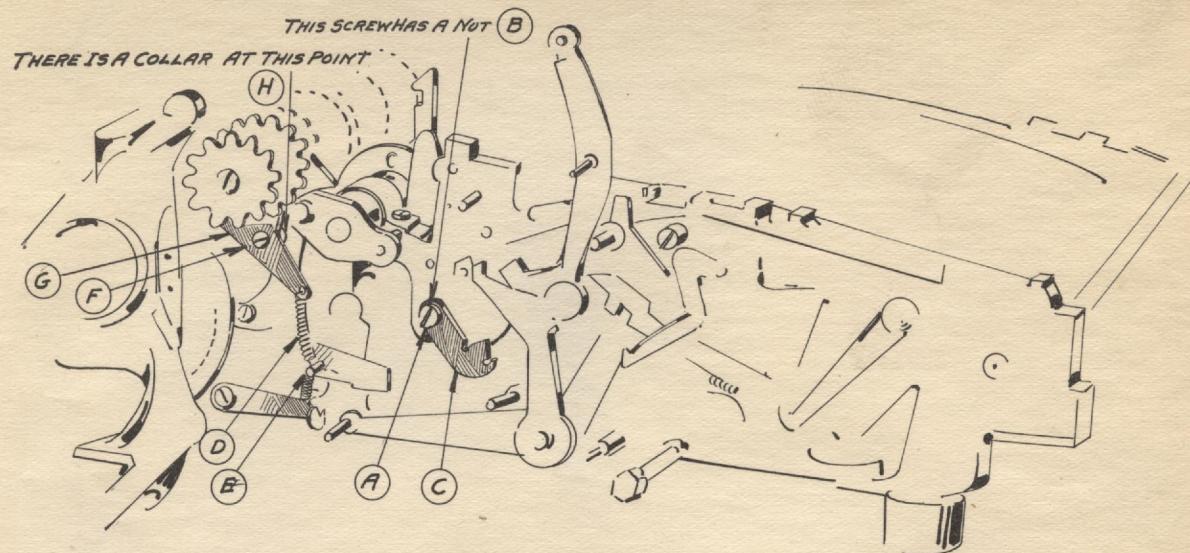
809 CLUTCH YOKE AS A UNIT MAY NOW BE REMOVED FROM MACHINE AND LAID ASIDE.



813 REMOVE NUT (N) WITH WRENCH #51 AND TAKE OUT SCREW (P)

814 TAKE PARTS (S) (T) OFF FROM MACHINE.

## NOTES ON DISMANTLING THE L.H. SIDE OF THE L.H. FRAME PARTS.



815 ALTHOUGH IN MOST REPAIRS IT WILL BE FOUND NEEDLESS TO DISMANTLE PARTS (C) AND (G) THEIR REMOVAL MAY BE EASILY EFFECTED. WHEN TAKING OUT (F) WATCH FOR COLLAR (H) AND LAY BOTH SCREW (F) AND COLLAR (H) ASIDE

## - NOTE -

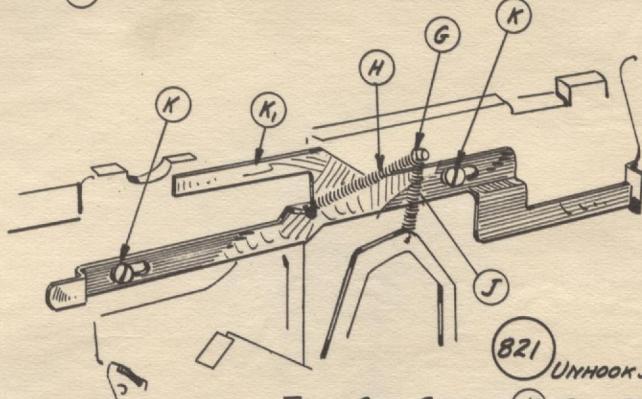
THE REST OF THE PARTS ON THE L.H. SIDE OF THE L.H. SIDE FRAME RESEMBLE AND FUNCTION AS DO THOSE OF THE REGULAR MACHINES AND MAY BE SERVICED AS SHOWN IN BULLETIN #34 PLATE 28 AND 29. THE TABLE BELOW IS A DIGEST OF L.H. SIDE FRAME PARTS.

PARTS THAT REMAIN THE SAME	PARTS THAT HAVE BEEN CHANGED	PARTS THAT HAVE BEEN ADDED	REMARKS
ASSEMBLIES	ASSEMBLIES	ASSEMBLIES	
7-76-D	7-60 to 12-60	12-41	751 IS REPLACED BY 1294
7-80	7-70½ to 12-70½	12-42	
7-93	7-72 to 12-72	12-44	
	7-74 to 12-74	12-51	
PARTS	7-77-D to 12-77	12-52	
311-D	73½-D to 12-78	12-54	
607-D	7-82 to 12-82	13-	
712		PARTS	
722½	PARTS	1001	1375
726 ¼	775 to 1153	1013	1398
	723½ to 1222	1018	
		1219	
		1232	
		1234	
		1235	
		1243	
		1254	
		1261	
		1281	
		1287	
		1317	
		1355	
		1368	

## NOTES ON DISMANTLING THE L.H. SIDE FRAME

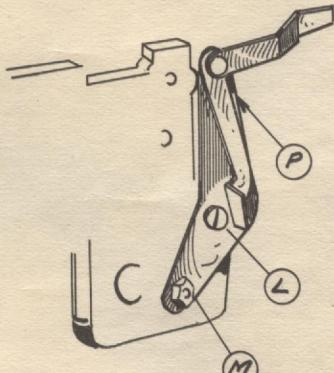
820

REMOVE BRACKET SCREWS (A) AND BRACKET  
MAY BE TAKEN OFF. DO NOT DESTROY ADJUSTMENTS  
OF (D) AND NUTS (E). LEVER (B) MAY BE REMOVED FROM BRACKET BY REMOVAL OF SPRING CLIP IN REAR,  
NOT SHOWN.



821

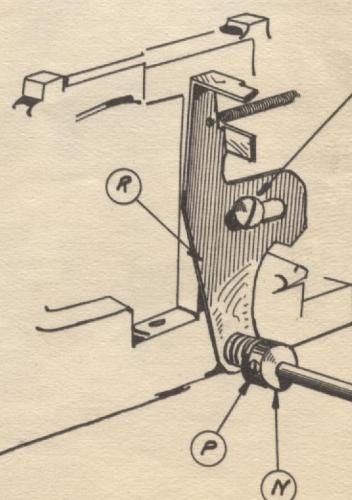
TAKE OUT SCREWS (K) AND REMOVE PART (K<sub>1</sub>)



822

REMOVE SCREW (L) AND NUT (M) USE WRENCH #51. PART (P) MAY THEN  
BE REMOVED.

NOTE - IT MAY BE FOUND ADVISABLE TO REMOVE THE L.H.  
CARRIAGE LOCK AND TWO SETS OF SELECTING BAILS TO  
PERFORM OPERATION #822



823

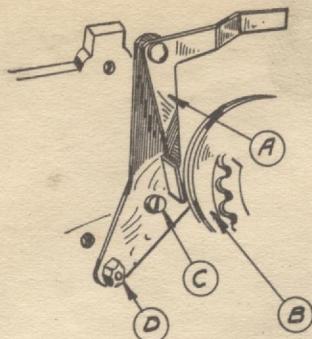
TAKE OUT SCREW (Q) AND LOOSEN  
SCREWS (P) IN COLLAR (N) AND HUB (T)

REMOVE REAR KEY SPRING. SLIDE ROD  
BACK IN DIRECTION OF ARROW. PART (R)  
MAY THEN BE REMOVED

THE L.H. SIDE FRAME MAY NOW BE CONSIDERED AS DISMANTLED

PLATE 12

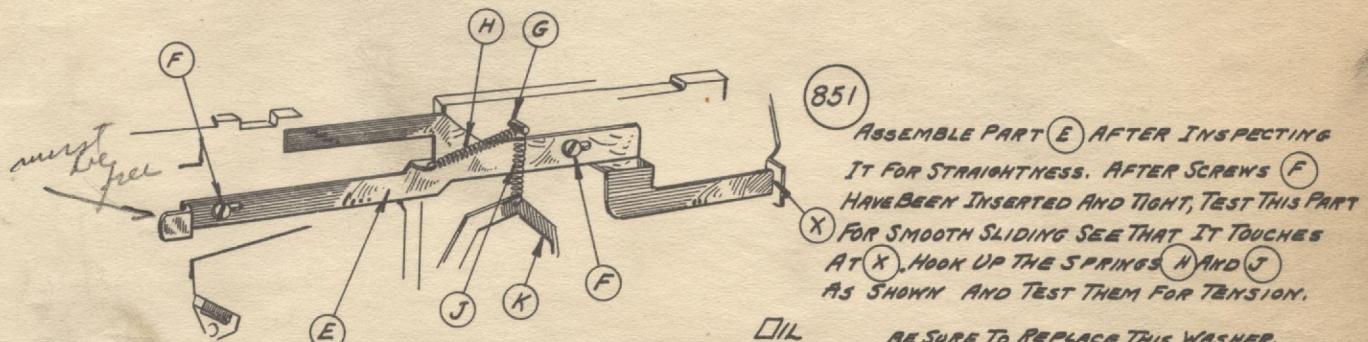
NOTES ON ADJUSTMENT AND REASSEMBLY OF THE L.H. SIDE FRAME PARTS.



850 TEST THIS PART FOR FREEDOM AND TIGHTNESS OF RIVETING. INSERT WITH ARM A DOWNWARD BETWEEN SCREW C AND SELECTING GEAR SHAFT B AS SHOWN. TIGHTEN SCREW C AND NUT D.

IT IS CONSIDERED GOOD PRACTICE TO TAKE OUT THE LEFT HAND CARRIAGE LOCK GROUP AS WELL AS TWO PAIRS OF BAILS. THIS GIVES THE PROPER ACCESS TO THE SCREWS AND NUTS WHEN ASSEMBLING THE L.H. SIDE FRAME PARTS.

LEAVE THESE PARTS OUT OF MACHINE UNTIL IT IS NOTED THAT THEY SHOULD GO BACK AGAIN.



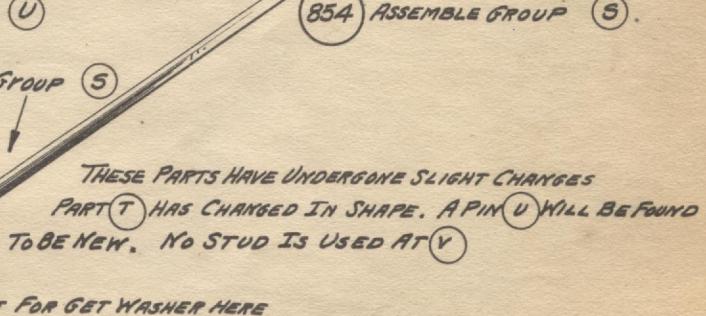
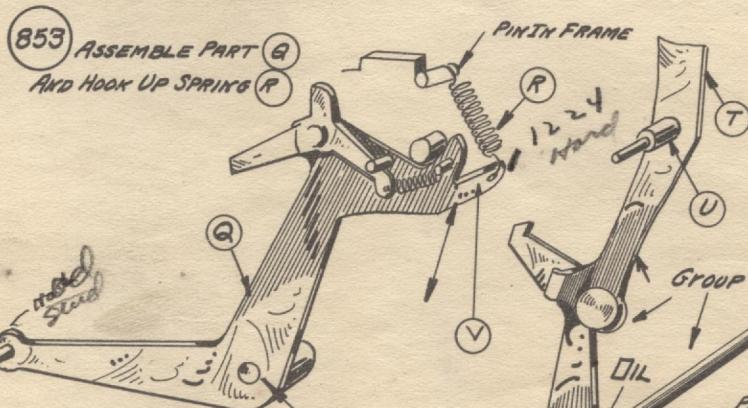
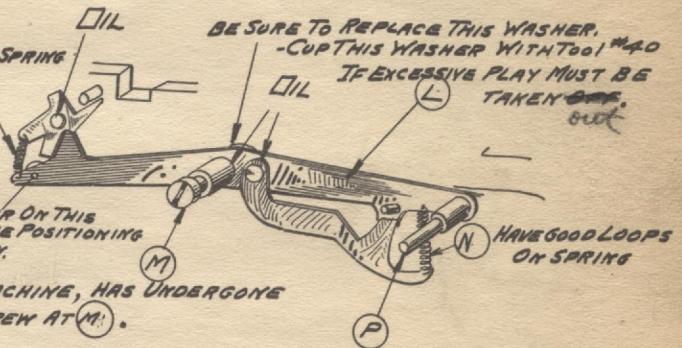
851 ASSEMBLE PART E AFTER INSPECTING IT FOR STRAIGHTNESS. AFTER SCREWS F HAVE BEEN INSERTED AND TIGHT, TEST THIS PART. X FOR SMOOTH SLIDING SEE THAT IT TOUCHES AT X, HOOK UP THE SPRINGS H AND J AS SHOWN AND TEST THEM FOR TENSION.

852 SEE ALSO PLATE 64. SERVICE BULLETIN "34.  
ASSEMBLE THE STOPPING LEVER L.

TEST IT FOR FUNCTION AND ALLOW NO EXCESSIVE PLAY. SEE THAT PINS, STUDS AND SCREWS ARE TIGHT.

SEE THAT ROLLER ON THIS STUD ENGAGES THE POSITIONING LEVER PROPERLY.

THIS LEVER, WHICH IS FOUND ON THE REGULAR MACHINE, HAS UNDERGONE CHANGES. A DIFFERENT PIN AT P A DIFFERENT SCREW AT M.

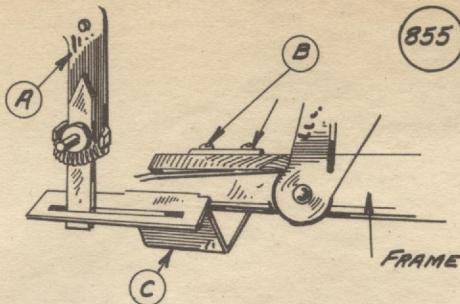


854 ASSEMBLE GROUP S.  
THESE PARTS HAVE UNDERGONE SLIGHT CHANGES. PART T HAS CHANGED IN SHAPE. A PIN U WILL BE FOUND TO BE NEW. NO STUD IS USED AT V.

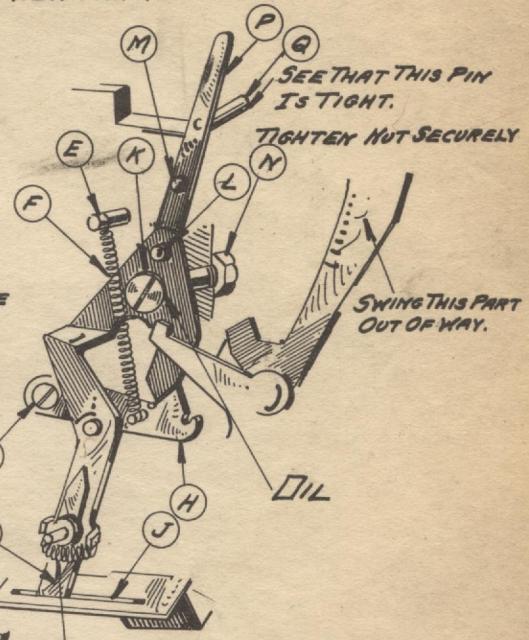
THE ADJUSTMENT NOTES ON PLATES 63-64-65 MACHINE SERVICE BULLETIN "34 SHOULD BE READ.

PLATE 13

NOTES ON ADJUSTING AND ASSEMBLING THE L.H. SIDE FRAME PARTS.



855 ASSEMBLE THE DIVISION LEVER GUIDE C WITH SCREWS B INTO FRAME, THIS IS A NEW PART.



856 ASSEMBLE THE DIVISION LEVER TO THE FRAME WITH SCREW K. THIS SCREW HAS A NUT N TIGHTEN THIS NUT SECURELY. THE PART P MAY BE ASSEMBLED WRONG. SEE THAT PIN Q POINTS INWARD AND IS TIGHT. P ITSELF IS LOOSELY FITTED. HOOK UP THE LATCH SPRING F, AS SHOWN, TO PIN E. TEST THE END J, IN SLOT J, OF THE GUIDE. TEST THE SPRING TENSION AT R.

TEST THE LEVER AFTER ASSEMBLY, FOR FREEDOM AND FUNCTION.

THIS IS A NEW PART.

857 PLACE DIVISION LEVER INTO-NEUTRAL-

TEST THIS SPRING FOR TENSION AND SEE THAT IT IS SECURELY HOOKED

BE SURE THIS NUT IS TIGHT

PLACE THIS LATCH IN A NEUTRAL POSITION /- ALLOWING SLIDE TO BE IN THE REAR POSITION.

SEE THAT LATCH FUNCTIONS SMOOTHLY.  
SLIDE

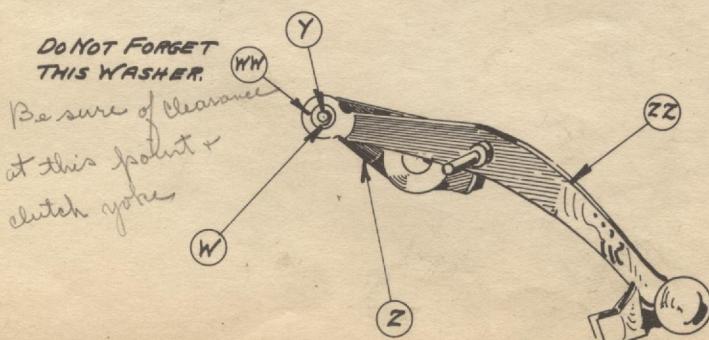
HOOK UP THIS SPRING U

DO NOT DISTURB THIS PIN.  
IF WORN ORDER NEW SLIDE.  
TEST THIS SPRING FOR LOOPS AND FUNCTION.

SEE THAT THIS SLIDE MOVES FREELY - NOT LOOSELY.

858 ASSEMBLE THE CLUTCH YOKE BY INSERTING PART S AND PUTTING ON NUT T.

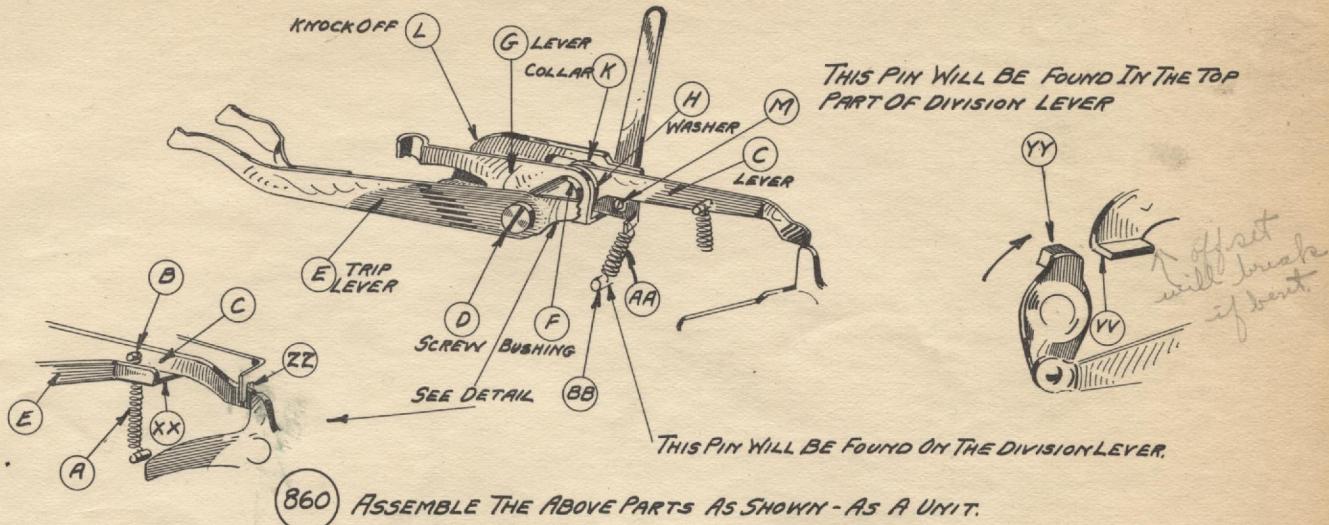
TEST FOR FUNCTION AND SMOOTH OPERATION. PLACE END V INTO ITS PROPER POSITION.  
CONSULT ALSO PLATE 66-67-68 MACHINE BULLETIN #34.



859 ASSEMBLE PART Z TO PART 2 AND PUT SPRING RING W ON STUD Y USING WASHER WW

NOTES ON ADJUSTING AND ASSEMBLING THE L.H. SIDE FRAME PARTS.

PLATE 14



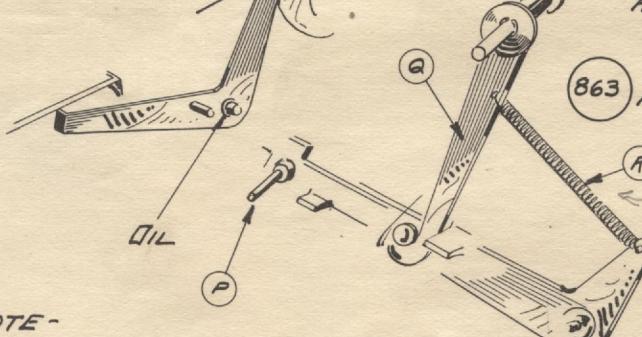
860 ASSEMBLE THE ABOVE PARTS AS SHOWN - AS A UNIT.

TEST THESE PARTS FOR SMOOTH FUNCTIONING. SET THE SCREW (D) TIGHTLY. PLACE PIN (M) IN SLOT OF (L). SEE THAT END OF (E) IS UNDER (C) AT (XX). END OF (C) MUST NOT BIND IN SLOT (ZZ). HOOK UP THE SPRINGS AS SHOWN AND TEST THE LATCHING AND TRIP. TEST ALSO TO SEE THAT LUG (YY) WILL THROW LEVER (L) BACK IN DIRECTION OF ARROW, AND THROW THE DIVISION LEVER INTO NEUTRAL WHEN (G) IS DEPRESSED AND MACHINE IS OPERATED BACKWARD.

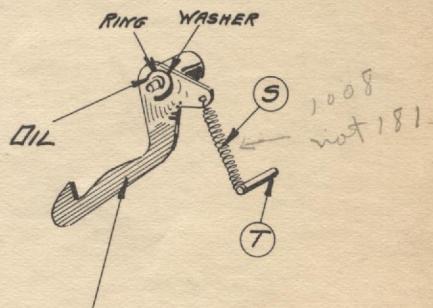
861 ASSEMBLE THE QUICK STOP LATCH.



862 ASSEMBLE THE STOPPING LEVER. THIS LEVER HAS BEEN SLIGHTLY CHANGED AND A PIN ADDED AT (P)



863 ASSEMBLE ALSO THE LIFTER (Q) AND HOOK UP SPRING (R)

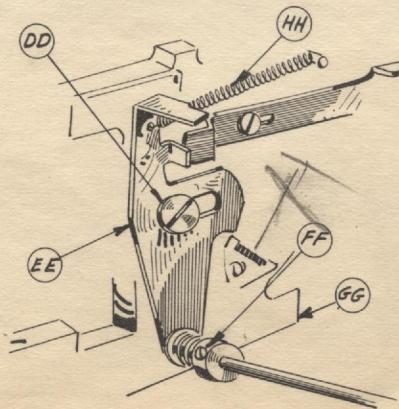


NOTE -

ADJUSTMENT NOTES ON THESE PARTS  
WILL BE FOUND ON PLATES #64-65-66-67-68-69  
MACHINE SERVICE BULLETIN NO. 34

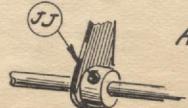
NOTE -

SEE PLATE 69  
BULLETIN #34  
FOR ADJUSTING.



864 ASSEMBLE ALSO THE LATCH FOR LOCATOR ARM.

865 ASSEMBLE PART (EE) WITH SCREW (DD). TIGHTEN SCREW (FF) IN COLLAR (GG) SECURELY. NOTE - TIGHTEN SCREW IN PART (JJ) NEAR R.H. SIDE FRAME. HOOK UP SPRING (HH) AS SHOWN.

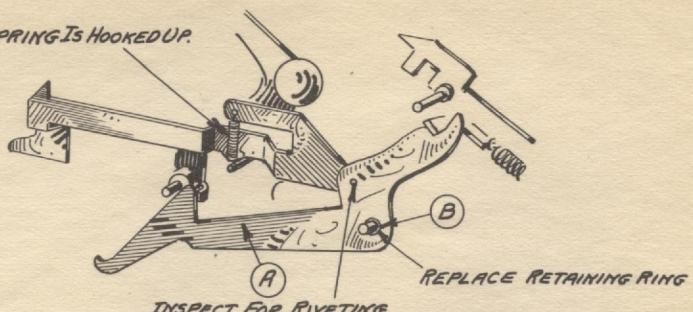


ALSO HOOK UP THE REPEAT KEY LATCH SPRING.

PLATE 15

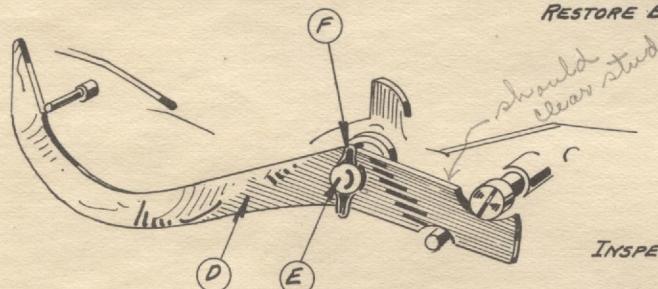
NOTES ON ASSEMBLING THE L.H. SIDE FRAME PARTS.

SEE THAT THIS SPRING IS HOOKED UP.



866 ASSEMBLE PART (A) UPON STUD (B) AND REPLACE RETAINING RING.

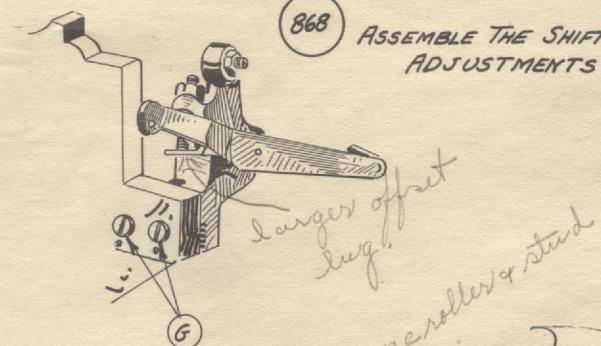
TEST FOR FUNCTION AND FREEDOM - MOVE DIVISION LEVER IN OPERATING POSITION AND RESTORE BY OPERATING CRANK.



867 ASSEMBLE PART (D) TO STUD (E) AND SECURE WITH CLIP (F).  
NOTE - INSPECT (D) FOR FREEDOM

INSPECT FOR STRAIGHTNESS

868 ASSEMBLE THE SHIFTER LEVER BRACKET BY INSERTING SCREWS (G) AS SHOWN.  
ADJUSTMENTS ON THIS BRACKET WILL BE MADE LATER.



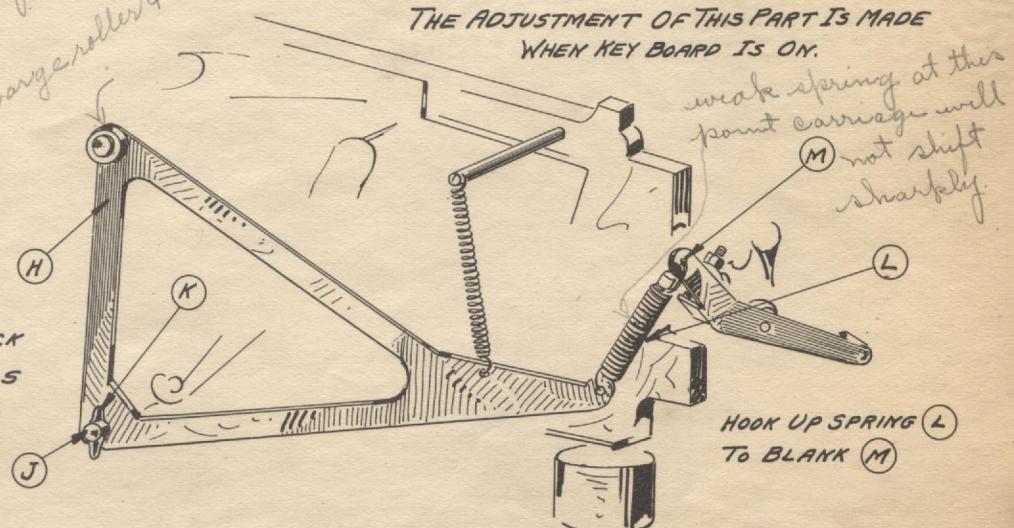
869 ASSEMBLE PART (H) UPON STUD (J) AND APPLY CLIP (K)

THE ADJUSTMENT OF THIS PART IS MADE WHEN KEY BOARD IS ON.

870

NOTE:

REPLACE THE CARRIAGE LOCK  
AND THE TWO SETS OF BAILS

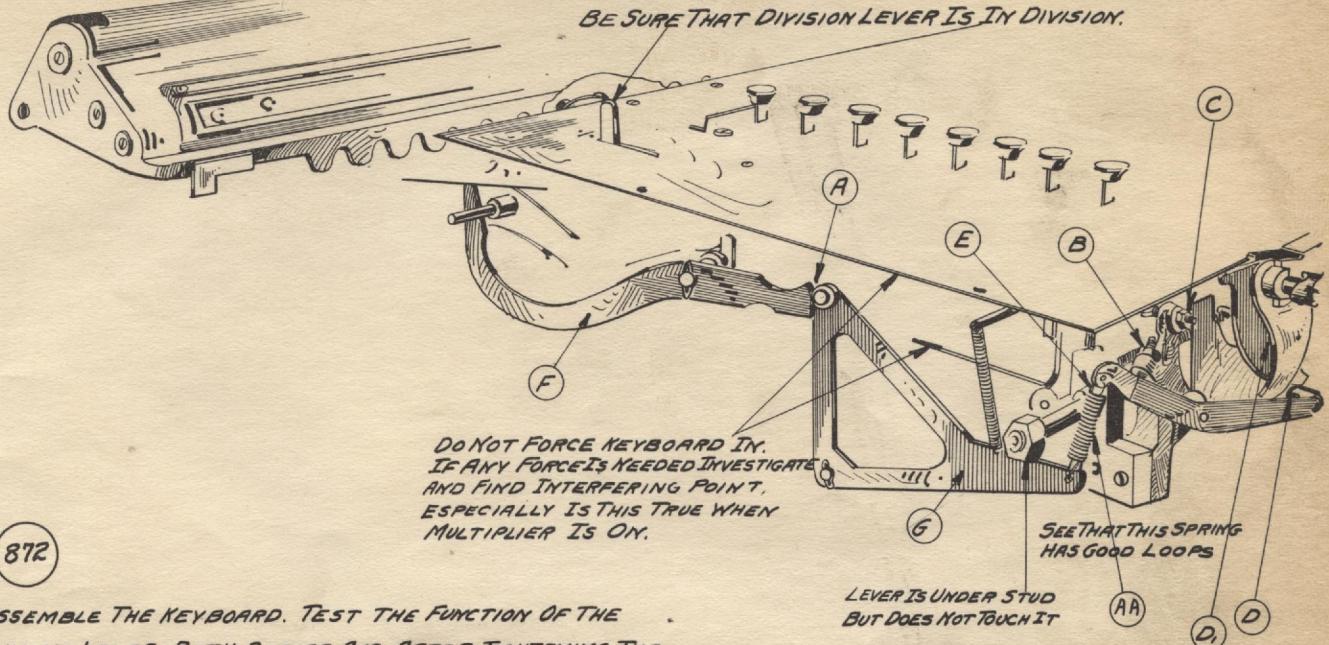


HOOK UP SPRING (L)  
TO BLANK (M)

871

PROCEED TO ASSEMBLE THE KEYBOARD TO THE MACHINE.

PLATE 16  
NOTES ON ASSEMBLING THE KEYBOARD AND ADJUSTING THE  
CARRIAGE SHIFT MECHANISM.

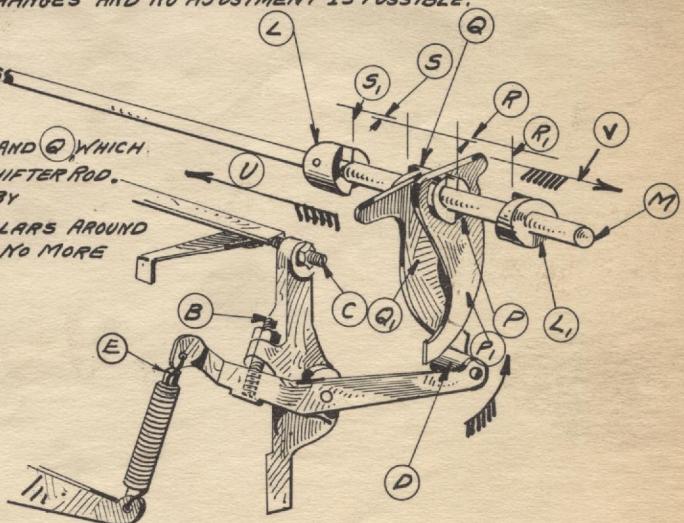


ASSEMBLE THE KEYBOARD. TEST THE FUNCTION OF THE  
DIVISION LEVER, BOTH BEFORE AND AFTER TIGHTENING THE  
KEYBOARD HOLDING SCREWS.

NOTE: AFTER KEYBOARD IS IN  
POSITION, RAISE L.H. FRONT  
CORNER SLIGHTLY AND LOCATE  
CAM **D** ON ROLLER **D**

THE NOTCH OF THE CARRIAGE AT **H** ENGAGES  
THE ROLL **J** IN PLATE **K**. THIS PLATE **K** IS PIVETED  
TO SHAFT **M**. UPON THIS SHAFT ARE PINNED CLUTCH COLLARS **L** AND **L<sub>1</sub>**. IT FOLLOWS  
THAT THE LOCATION DETERMINED BY **H** REMAINS CONSTANT AND LINE **S<sub>1</sub>** AND **R**  
CHANGES IF **H** CHANGES AND NO ADJUSTMENT IS POSSIBLE.

THE ADJUSTMENT IS MADE WITH THE CLUTCH COLLARS **P** AND **Q** WHICH  
ARE RIVETED TO CAMS **P** AND **Q** AND ARE LOOSE ON THE SHIFTER ROD.  
ROLL **D**, BEING PLACED AS SHOWN, IS RAISED OR LOWERED BY  
ADJ. SCREW **B**. THE ROLL, IN RISING, CAMS THE CLUTCH COLLARS AROUND  
AND PERMITS MESHING. CLEARANCE **S** AND **R** SHOULD BE NO MORE  
THAN  $\frac{1}{64}$  OF AN INCH



THE THROW IN DIRECTION OF ARROW **U** IS ADJUSTED  
BY BENDING THE BLADE **W** OF THE CLUTCH YOKE SLIGHTLY.

THE THROW IN DIRECTION OF ARROW **V** IS CONTROLLED BY ADJ. SCREW **C**

NOTE - IT IS IMPORTANT THAT A CLEARANCE OF  $\frac{1}{64}$ " BE MAINTAINED AT **A** BETWEEN LEVER **F** AND LEVER **G**  
AS SHOWN AT TOP OF PAGE. TO ACQUIRE THIS CLEARANCE, IF OTHER ADJUSTMENTS HAVE TAKEN IT AWAY, IT IS BEST  
TO SHORTEN PIN **E** WITH A FILE SLIGHTLY.

873 ASSEMBLE THE CLEAR-REPEAT-AND-NON-REPEAT KEYS. 874 ASSEMBLE THE PLUS AND MINUS KEYS.  
TEST FOR FUNCTION. TEST FOR FUNCTION.

875 ASSEMBLE THE ZERO KEY MECHANISM.

PLATE 17

NEUTRAL POSITIONS OF PARTS CONTROLLING LOCATOR ARM.

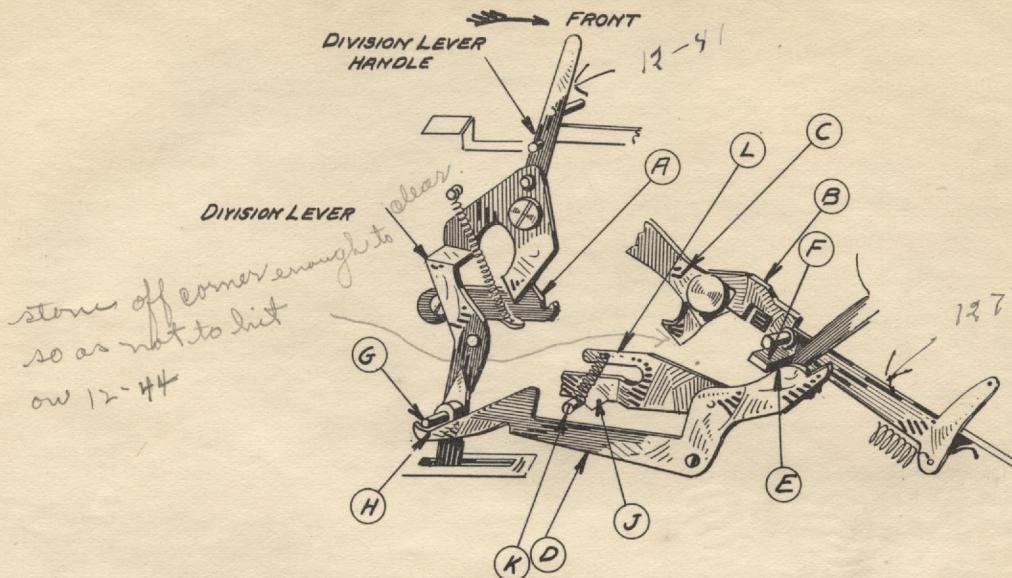


FIG. 1

DIVISION LEVER IS IN NEUTRAL WHEN FOUND PUSHED TO FRONT. IN THAT POSITION IT IS HELD BY LATCH (A). THE MACHINE LOCATOR ARM (B) IS IN FRONT OF CONNECTING LINK (C). LIFTER (D) LIES AGAINST LUG (F) AT (E) AND PIN (G) ENGAGES LIFTER AT (H). NOTE ALSO THAT RELEASE LEVER (L) HAS A PROJECTION (J) WHICH RESTS AGAINST PIN (K) AT THE RIGHT OF THE PIN.

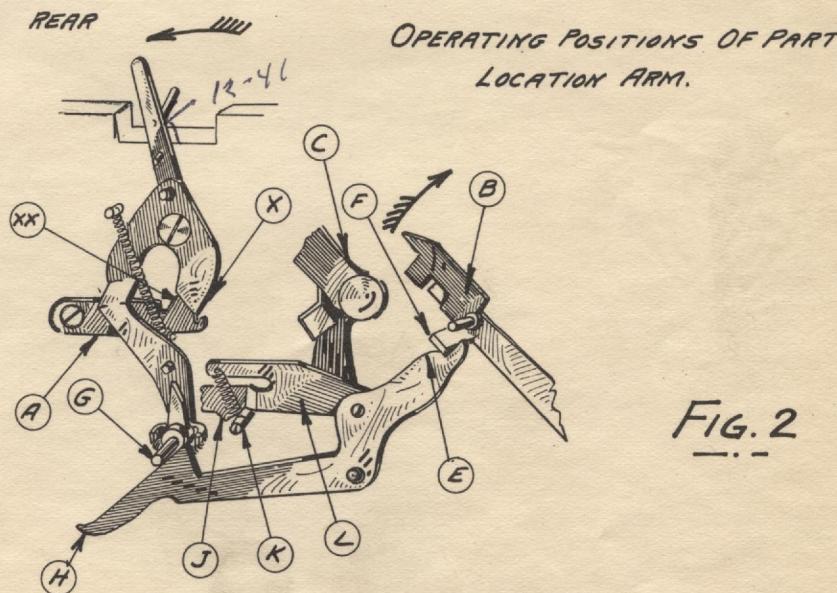


FIG. 2

NOTE 1 - PIN (G) HAS DEPRESSED (H)

- 2 - CAM SURFACE (E) HAS RAISED LOCATOR ARM (B) BY ENGAGING (F)
- 3 - (L) HAS MOVED FORWARD AND PROJECTION (J) IS NOW ON THE LEFT OF THE PIN (K)
- 4 - LATCH (A) NOW HOLDS DIVISION LEVER AT XX INSTEAD OF (X)

NEUTRAL POSITIONS OF PARTS CONTROLLING THE CLUTCH YOKE

PLATE 18

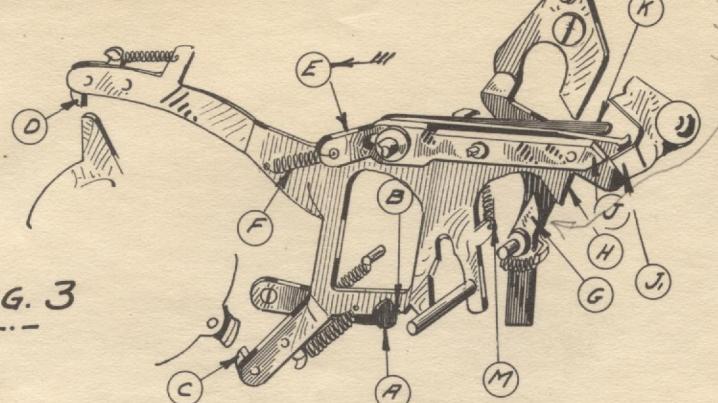


FIG. 3

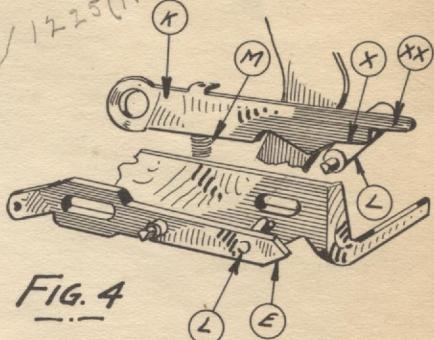


FIG. 4

DIVISION LEVER IS IN NEUTRAL WHEN FOUND PUSHED TO FRONT.

CLICK A WILL BE FOUND IN CENTER NOTCH B AND CLUTCH YOKE POINT C NOT ENGAGED.

EXTENSION E IS HELD BACK BY SPRING TENSION F. PAWL G IS TO THE LEFT OF POINT H. A POINT TO POINT CONDITION EXISTS AT J AND J1. LATCH K IS BEHIND CLUTCH YOKE HELD BY SPRING M AGAINST FACE X OF K BY PIN L WHICH IS RIVETED TO E.

OPERATING POSITIONS OF PARTS CONTROLLING THE CLUTCH YOKE.

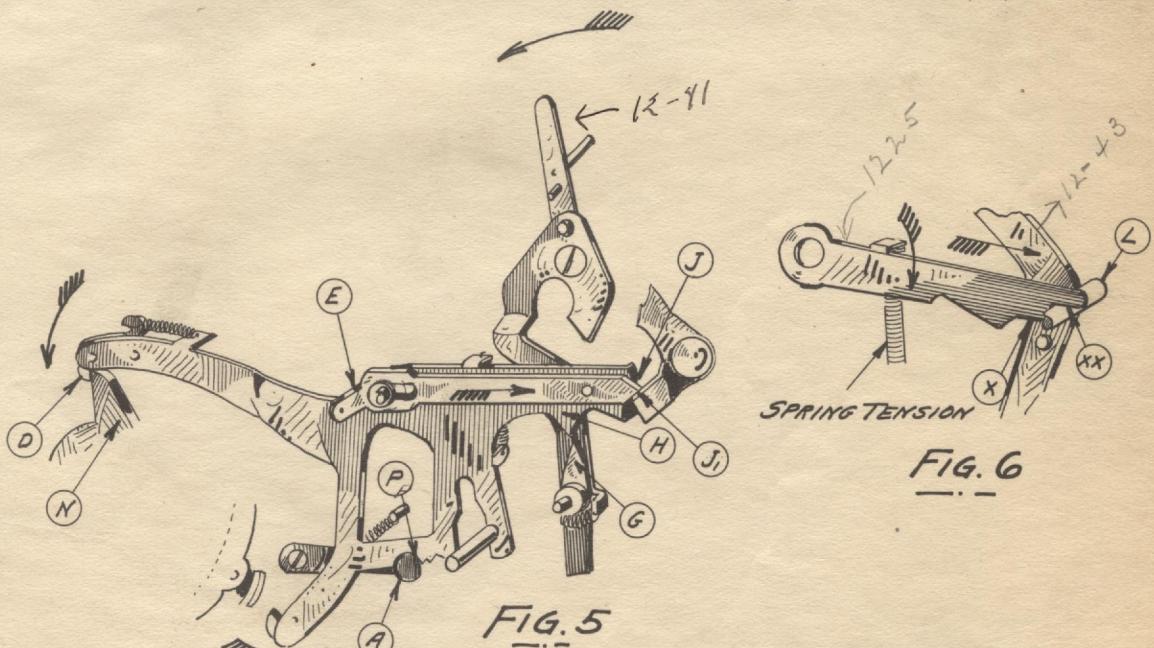


FIG. 5

FIG. 6

NOTE: 1-MOVEMENT OF DIVISION LEVER CAUSES PAWL G TO STRIKE POINT H, THROWING IT UPWARD.  
2-CLICK A NOW ENGAGES REAR NOTCH OF CLUTCH YOKE.

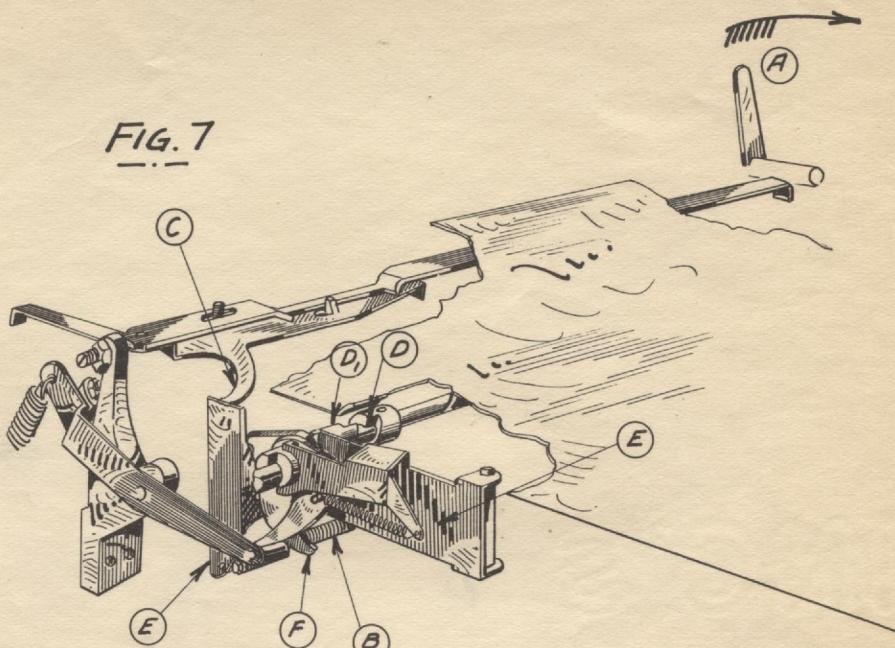
3-CLUTCH YOKE LATCH D ENGAGES SUBTRACTION SPIDER N.

4-MOVEMENT OF LEVER HAS ALSO CAUSED PIN L TO REST AT XX, INSTEAD OF AT X AS BEFORE  
LOCKING EXTENSION E INTO FORWARD POSITION SO THAT POINT J IS ABOVE J1 AS SHOWN.

SHOWING PARTS CONTROLLING THE ENGAGEMENT OF DIVISION  
CARRIAGE SHIFT CLUTCH.

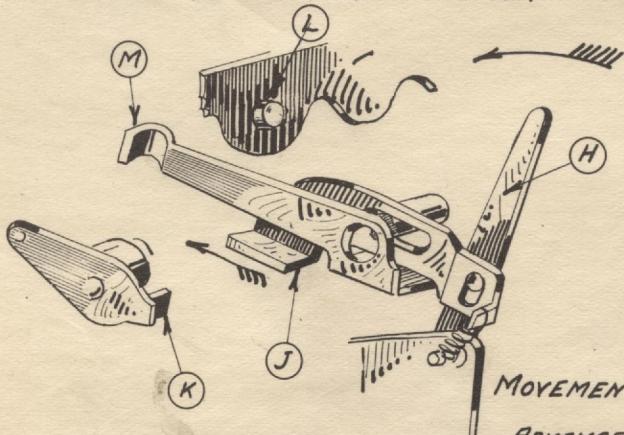
PLATE 19

FIG. 7



Moving division lever (A) in direction of arrow, causes point (C) to recede. Spring (B) then causes cam shifter (E) to engage clutch (D), with (D-D) is attached to cam (F), which controls the carriage shifting necessary to division.

SHOWING PARTS CONTROLLING THE AUTOMATIC RETURN OF THE DIVISION  
LEVER TO NEUTRAL POSITION



Movement of the division lever (H), in direction of arrow, advances slide (J) so it will be in the path of lug (K), when stud (L) on carriage reaches a position to engage (M) and press it downward.

FIG. 8

PLATE 20

SHOWING MOVEMENT OF PARTS EFFECTING THE CHANGE FROM A SUBTRACTING  
TO AN ADDING CYCLE.

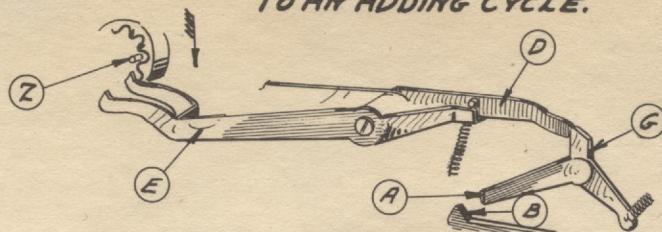


FIG. 9

THE ADVANCEMENT OF THE DIVISION LEVER IN DIRECTION OF ARROW, SHOWN ON PLATE 17, STARTS THE MACHINE DIVIDING. THIS CONTINUES UNTIL AN OVERCARRY IS EFFECTED. AN OVERCARRY CAUSES PIN Z TO DEPRESS E, CAUSING D TO RISE AND DISENGAGE POINT G. THIS ALLOWS SURFACES A B TO ENGAGE AS SHOWN IN FIG. 10.

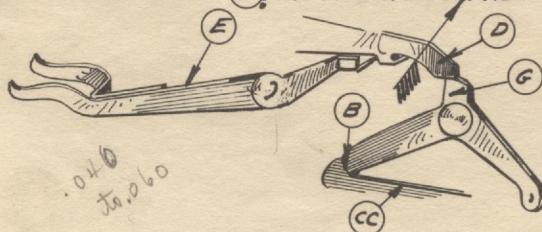


FIG. 10

THE ENGAGEMENT OF POINT A B CAUSES THE LEVER CC, FIG. 12, TO CARRY AA AS FAR AS THE BUMPER BB. A PIN H ON THE OTHER END OF AA RISES WITH MOTION AND ENGAGES SLOT J AND CENTRALIZES THE CLUTCH YOKE, DISENGAGING THE MOTOR DRIVEN SUN GEAR. THE CLICK K HAS BEEN FORCED INTO THE NEUTRAL NOTCH AND SERVES TO HOLD THE CLUTCH YOKE IN THE DISENGAGED POSITION.

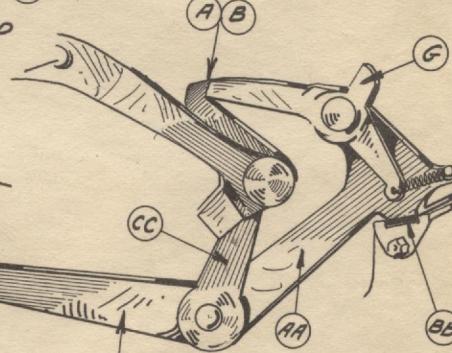
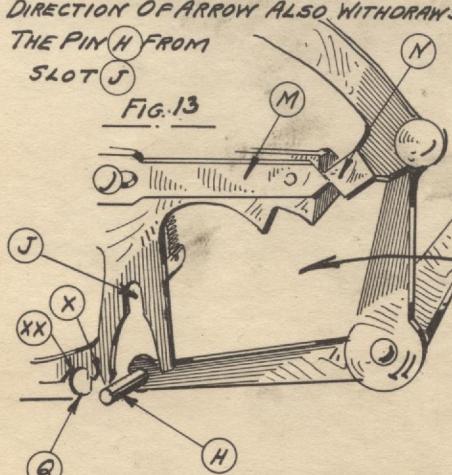


FIG. 12

AFTER THE COMPLETION OF A CYCLE, AS SHOWN ON FIG. 12, A REBOUND OCCURS. THE REBOUND SWEEPS POINT N IN DIRECTION OF ARROW XX TO THE POSITION SHOWN IN FIG. 13. THE CLUTCH YOKE, BEING IN NEUTRAL AND EXTENSION M BEING IN FORWARD POSITION, ALLOWS THE POINT N TO LOCATE OVERPOINT K OF EXTENSION M. THIS MOTION IN DIRECTION OF ARROW ALSO WITHDRAWS THE PIN H FROM SLOT J.

FIG. 13



THE COMPLETION OF THE REBOUND [FIG. 14] CAUSES POINT N TO DEPRESS M. THIS THROWS THE CLUTCH YOKE INTO ADDING POSITION. R<sub>1</sub> ENGAGES AND CLICK Q IS ENGAGED AT X.

NOTE: - WHEN POINT G RETURNED

(IT AGAIN STRUCK D AND LIFTED POINT A B OUT OF ENGAGEMENT)

M

N

XX

H

Q

R<sub>1</sub>

G

D

A

B

Z

E

C

F

BB BUMPER

NOTE

BESURE THAT THIS PAWL IS RESTING IN THE POSITION SHOWN

MACHINE WILL NOW ADD ONE STROKE ONLY.

SHOWING THE MECHANISM OF THE CARRIAGE SHIFT.

PLATE 21

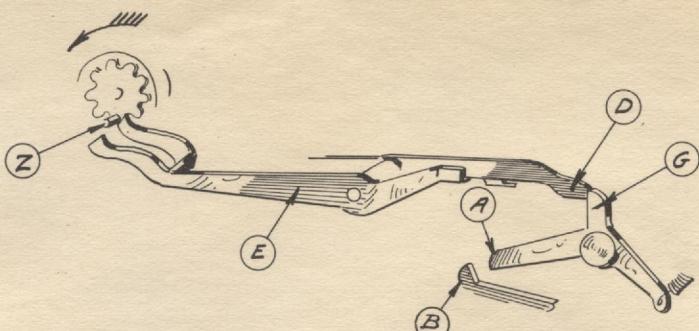


FIG. 15

DURING THE ADDING REVOLUTION AN OVERCARRY IS AGAIN EFFECTED. AN OVERCARRY CAUSES PIN Z TO DEPRESS E, CAUSING D TO RISE AND DISENGAGE POINTS D G. THIS ALLOWS SURFACE AB TO ENGAGE AS SHOWN IN FIG. 16: THE ENGAGEMENT OF POINT AB CAUSES THE LEVER CC TO CARRY AA TO AS FAR AS THE BUMPER BB. A PIN H ON THE OTHER END OF AA RISES WITH MOTION AND ENGAGES SLOT J AND CENTRALIZES THE CLUTCH YOKE, DISENGAGING THE MOTOR DRIVE.

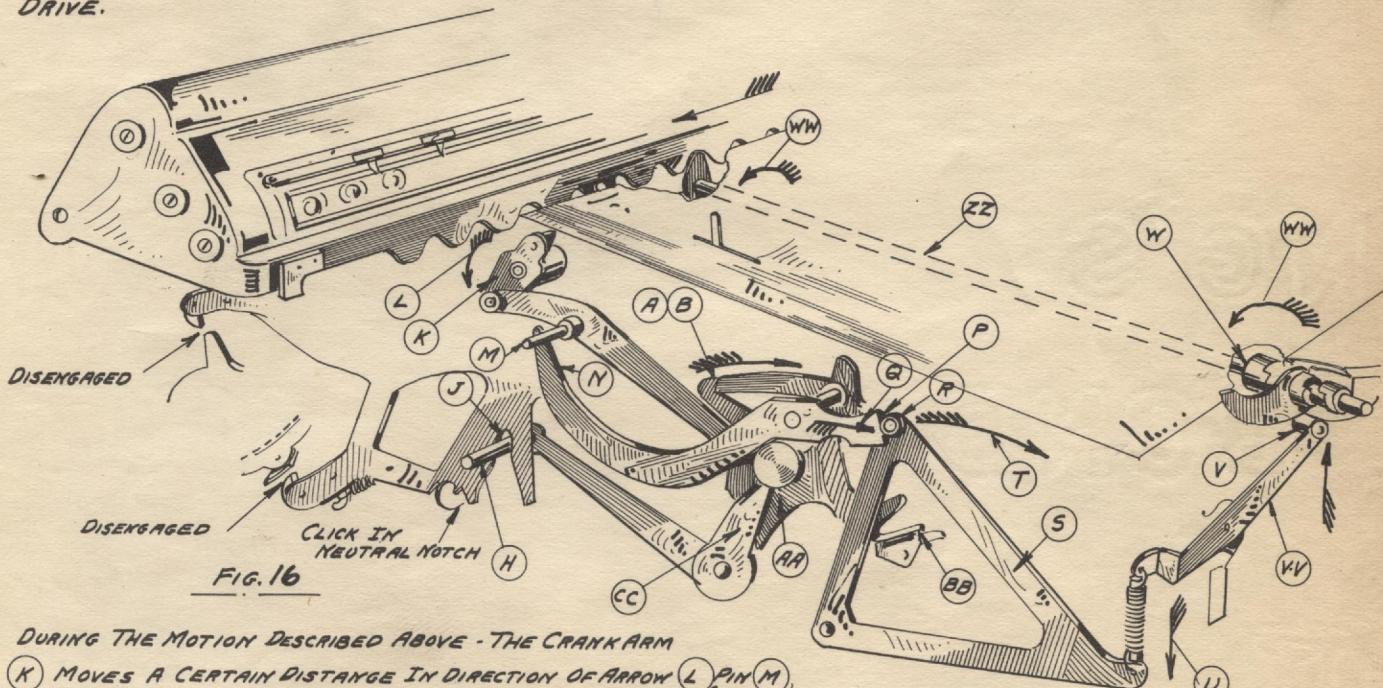


FIG. 16

DURING THE MOTION DESCRIBED ABOVE - THE CRANK ARM K MOVES A CERTAIN DISTANCE IN DIRECTION OF ARROW L. PIN M, ON CONNECTING LINK, ENGAGES THE REAR END OF LEVER AT N. THE FORWARD END P ADVANCES IN DIRECTION OF ARROW G AND ENGAGES ROLLER R. THIS ENGAGEMENT, IN TURN ROCKS LEVER S IN DIRECTION OF ARROW T AND CAUSES DEPRESSION OF THE FLEXIBLE CONNECTION IN DIRECTION OF ARROW U. THIS, IN TURN CAUSES LEVER END V AND ROLLER V TO RISE AND ROTATE THE CARRIAGE SHIFT CAMS. THE SUBTRACTING CLUTCH W BEING IN ENGAGEMENT, THIS MOTION OF THE CAMS REVOLVES THE CARRIAGE SHIFT ROD ZZ IN DIRECTION OF ARROW WW. THIS MOTION SHIFTS THE CARRIAGE HALFWAY AND ITS MOMENTUM AND WEIGHT COMPLETE THE OPERATION OF SHIFTING.

A REBOUND FROM THE BUMPER BB NOW OCCURS. IN THE REBOUND, THE PARTS CONTROLLING THE CARRIAGE SHIFT, RETURN TO NORMAL POSITION, BUT THE SUBTRACTING CLUTCH W REMAINS ENGAGED.

HOWEVER, THE NOSE FF ON THE LINK HITS THE POINT EE OF THE CLUTCH EXTENSION AND SHIFTS THE CLUTCH YOKE INTO THE SUBTRACTION POSITION AND MACHINE CONTINUES TO OPERATE.

FIG. 17

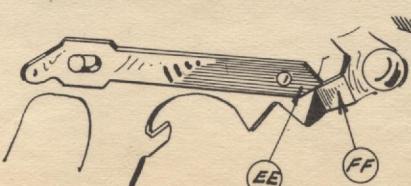


FIG. 18

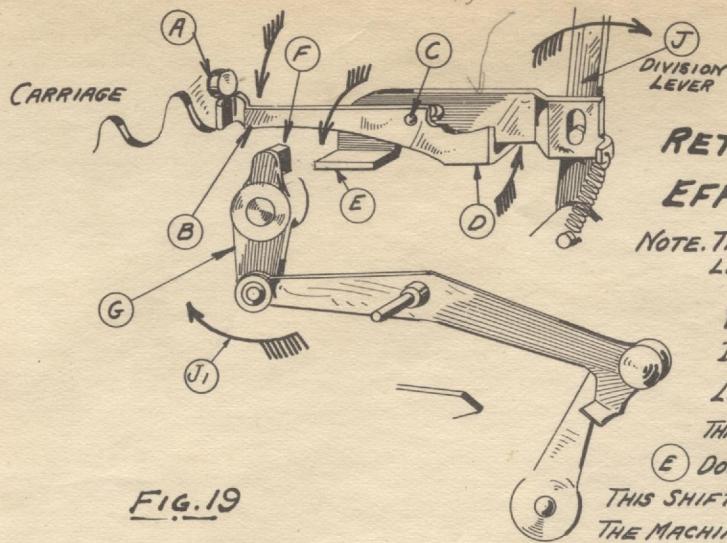


FIG. 19

PLATE 22  
SHOWING HOW THE DIVISION LEVER IS  
RETURNED AUTOMATICALLY AND HOW IT  
EFFECTS THE STOPPING OF MACHINE.

NOTE. THE SAME MOVEMENT TAKES PLACE IF THE DIVISION LEVER IS AT ANY TIME PULLED BACK BY HAND.

WHEN CARRIAGE IS SHIFTED AUTOMATICALLY INTO ITS EXTREME LEFT POSITION, THE STUD A DROPS UPON LEVER B AND DEPRESSES IT. THIS DEPRESSION, ACTING THROUGH FULCRUM C RAISES END D, FORCING END OF LEVER E DOWN INTO PATH OF PIN F ON CRANK ARM G. AFTER THIS SHIFT AND DEPRESSION OF PARTS HAS TAKEN PLACE, THE MACHINE STARTS AGAIN TO DIVIDE AS BEFORE. HOWEVER, DURING THIS STROKE, PIN F ON THE CRANK ARM G, REVOLVING IN DIRECTION OF ARROW J<sub>1</sub>, ENGAGES THE DEPRESSED END OF E AND PUSHES THE DIVISION LEVER J INTO THE NEUTRAL POSITION.

NOTE - THE PUSHING BACK OF THE DIVISION LEVER DOES NOT IN ITSELF STOP THE FUNCTIONING OF THE MACHINE IT WILL CONTINUE TO DIVIDE UNTIL AN OVERCARRY IS EFFECTED.

THE OVERCARRY-EFFECTING A TRIP-CAUSES THE CYCLE SHOWN ON PLATE 20 FIG 9-10-12. HOWEVER, THE DIVISION LEVER BEING PUSHED TO NEUTRAL-CAUSES - 1 PIN L HAS RAISED LEVER H BY CONTACT L WITH K

- 2 END J IS BEHIND PIN J<sub>1</sub>.
- 3 END M IS AWAY FROM SURFACE N
- 4 LUG Q IS STILL HELD UP BY LEVER N

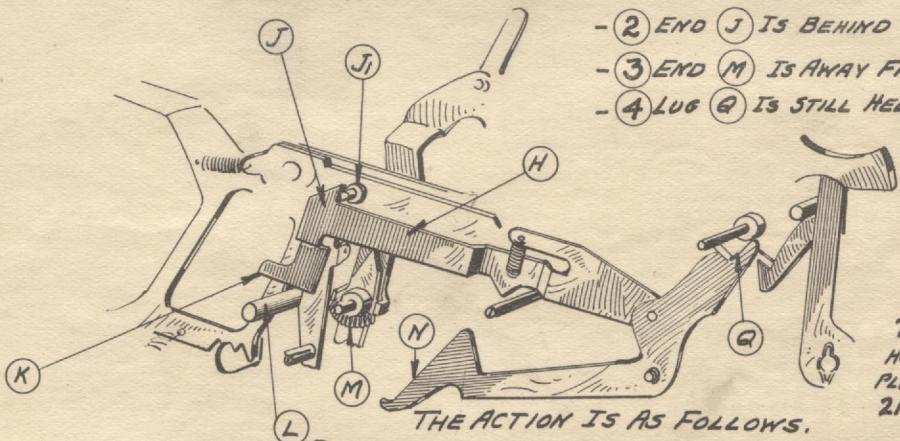


FIG. 20

THE ACTION CAUSED BY THE REBOUND  
HOWEVER IS NOW DIFFERENT THAN IN  
PLATE 20 AND IS SHOWN BELOW IN FIG.  
21 AND 22.

THE MOVEMENT FORWARD OF THE LEVER V DURING THE REBOUND, CAUSES SURFACE BB TO TAKE POSITION SHOWN IN FIG. 21. FURTHER MOVEMENT DEPRESSES R AS IN FIG. 22. THE MOVEMENT ALSO HAS PLACED THE CLUTCH INTO THE ADDING POSITION FOR THE FINAL ADDING STROKE.

THE POSITION OF THE DIVISION LEVER U FIG. 21, HAS PLACED PIN W UNDER SURFACE EE ON T. THIS PIN W BEING STATIONARY, THE MOVEMENT DOWNWARD OF THE LEVER R SERVES TO DISENGAGE THE PIN S FROM SURFACE CC. THIS PIN S BEING ATTACHED TO THE EXTENSION R, ITS SPRING WILL PULL THE ARM BACK AND PIN WILL LOCATE AT SURFACE DD AS IN FIG. 22.

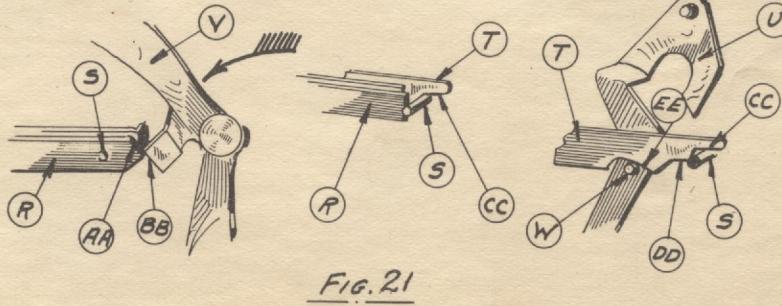


FIG. 21

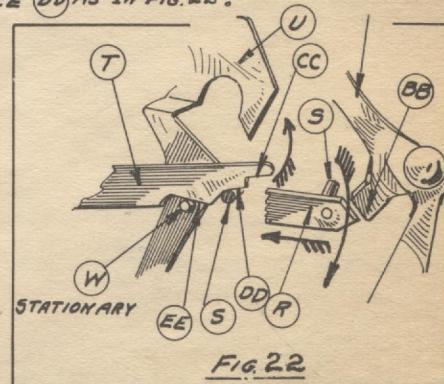


FIG. 22

CONTINUED FROM PLATE 22

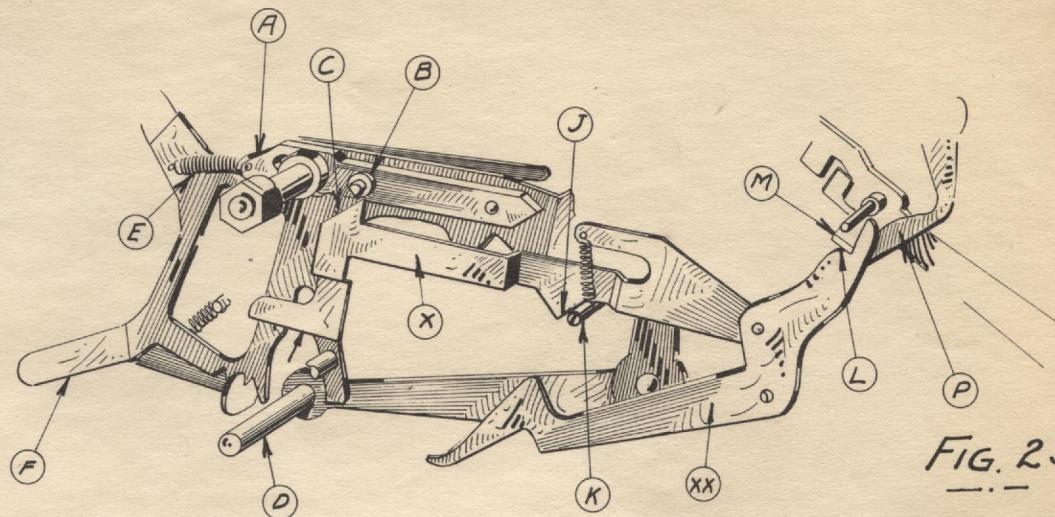


FIG. 23

EXTENSION ARM **A**, HAVING BEEN DRAWN BACK BY SPRING **E**, PIN **B** TAKES A POSITION IN THE PATH OF SURFACE **C**.

THE MACHINE NOW TAKES THE FINAL ADDING STROKE. AN OVERTAKE OCCURS, WHICH BRINGS THE MECHANISM AGAINST THE BUMPER AS PREVIOUSLY EXPLAINED.

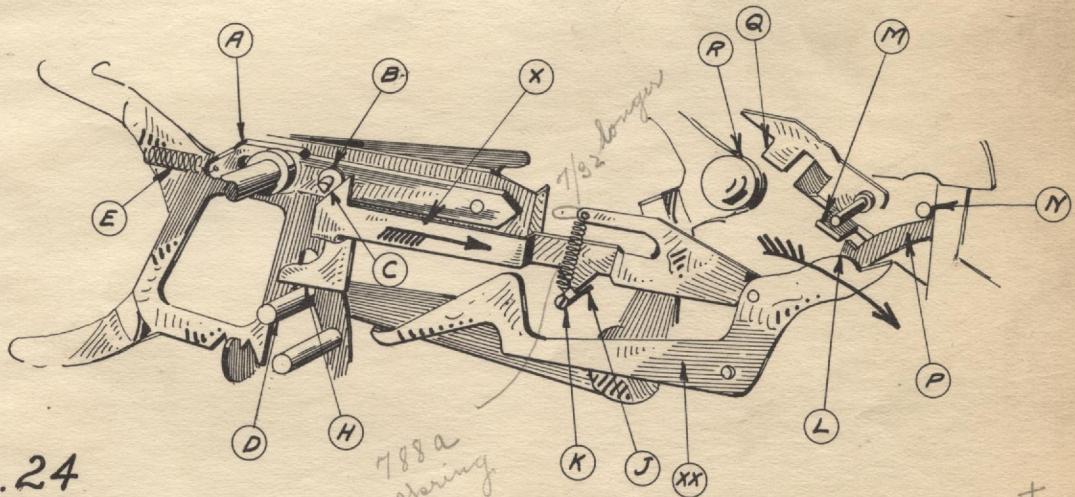


FIG. 24

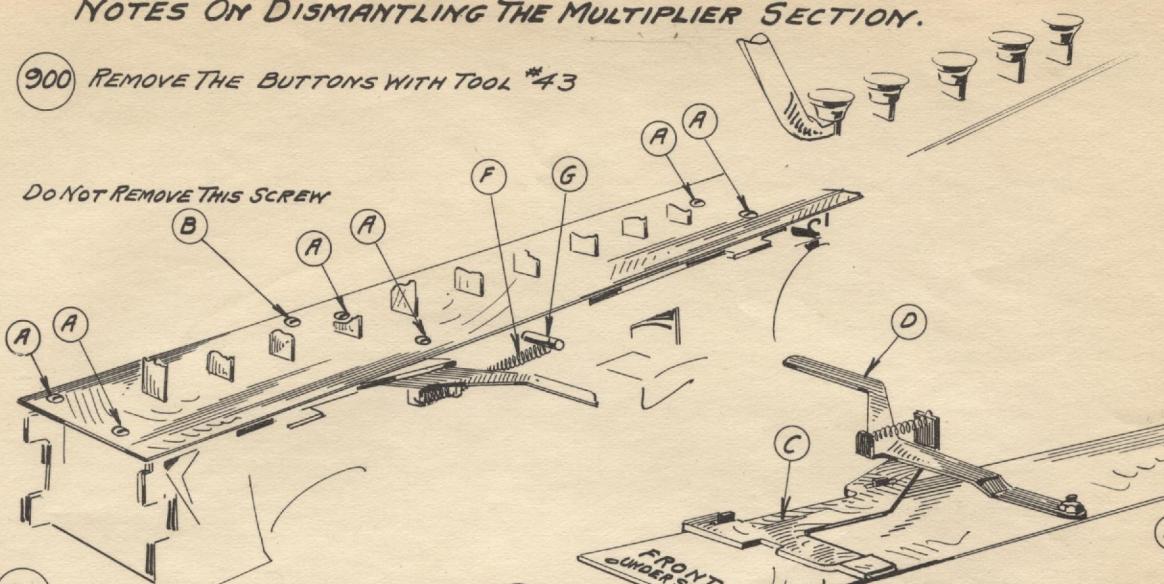
Important

HOWEVER, THE MOVEMENT TO THE BUMPER HAS RAISED PIN **D** UP INTO CONTACT WITH SURFACE **H** RAISING THE LEVER **X**, THIS CAUSES SURFACE **C** TO CAM AGAINST PIN **B**, CAUSING A MOVEMENT IN DIRECTION OF ARROW. LEVER **X** BEING CONNECTED TO LEVER **XX**. IT ROCKS **XX** IN DIRECTION OF ARROW, DISENGAGING SURFACE **L** FROM LUG **M** and projection on lever (X) at right of pin (K). THE MOVEMENT TO THE BUMPER HAS ALSO UNLATCHED **P**, AS IN REGULAR MACHINES, ALLOWING LEVER **Q** TO DROP ONTO **R**.

AS THE PARTS RETURN TO NORMAL, FROM THE BUMPER TO CENTRAL, LEVER **Q** DROPS IN FRONT OF **R** AND LOCKS THE MACHINE AND ALL PARTS HAVE ASSUMED THE NEUTRAL POSITION SHOWN ON PLATE 17 AND 18 FIG 1-3-4.

## NOTES ON DISMANTLING THE MULTIPLIER SECTION.

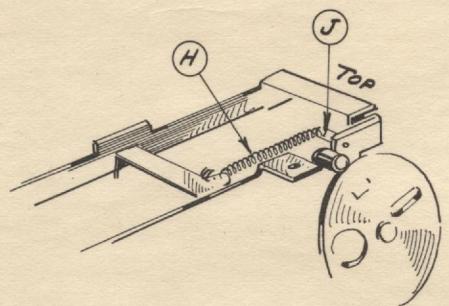
900 REMOVE THE BUTTONS WITH TOOL #43



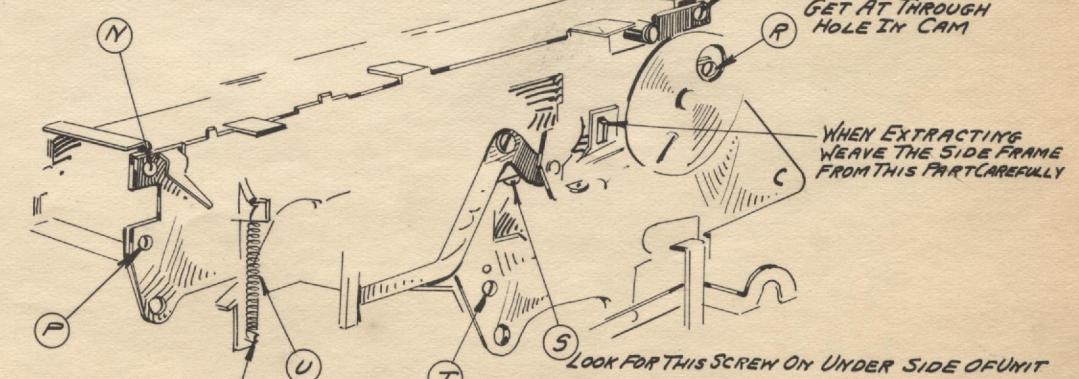
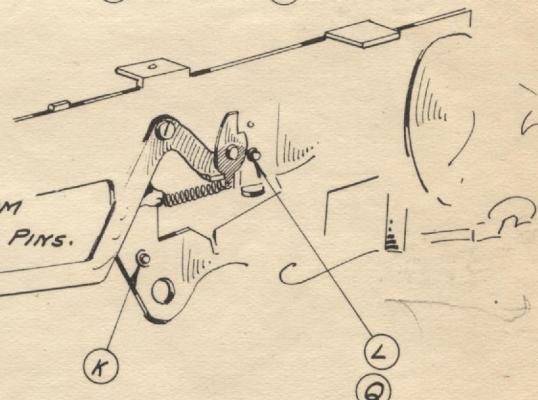
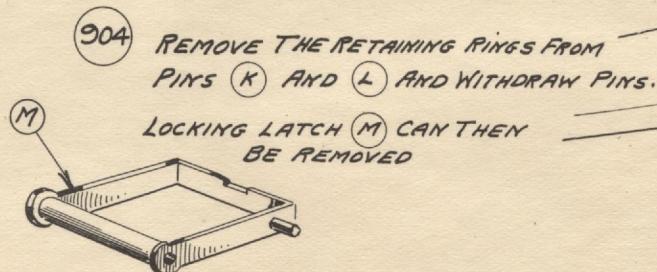
901 UNHOOK SPRING F FROM PIN G. REMOVE SCREWS A [6 OF THEM]

902

WE ADVOCATE THAT SUB-ASSEMBLIES BE NOT DISMANTLED AS FAR AS POSSIBLE. THE ABOVE VIEW SHOWS PROPER LOCATION OF PARTS C D E TO EACH OTHER.



903 REMOVE SPRING H FROM PIN J



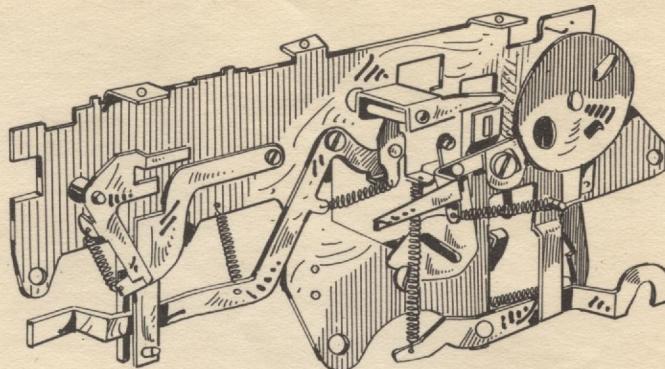
905

REMOVE SCREWS N P Q R S T UNHOOK SPRING U FROM PIN V AND WEAVE OFF THIS MULTIPLIER SIDE FRAME. LAY ASIDE THE RIGHT HAND ASSEMBLY.

SUPPORTS A BRACE

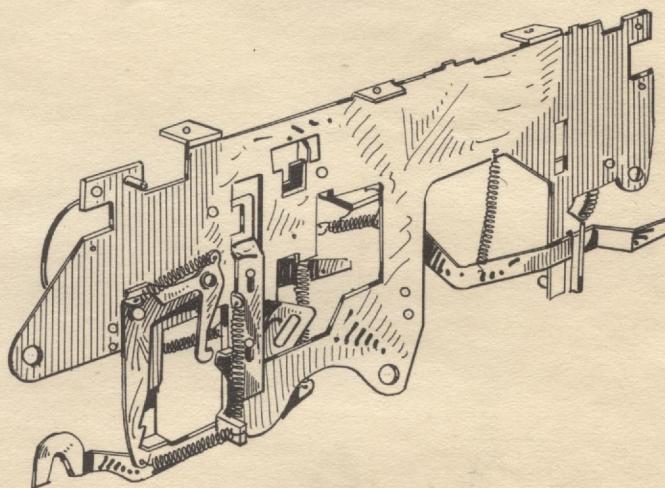
## NOTES ON DISMANTLING THE MULTIPLIER SECTION.

906 DO NOT DISMANTLE THE R.H. SIDE FRAME OF THE MULTIPLIER FURTHER, UNLESS NECESSARY. REFER TO THE PARTS CATALOGUE FOR DETAILS OF ITS SUB ASSEMBLIES.



OUTSIDE VIEW

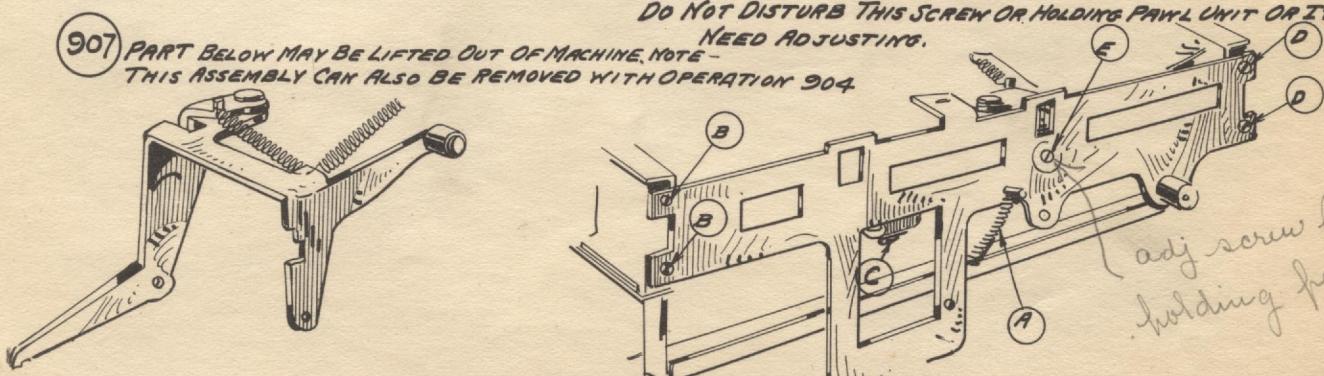
SHOWING RELATION OF THE PARTS TO EACH OTHER ON THE OUTSIDE OF R.H. SIDE FRAME.



INSIDE VIEW

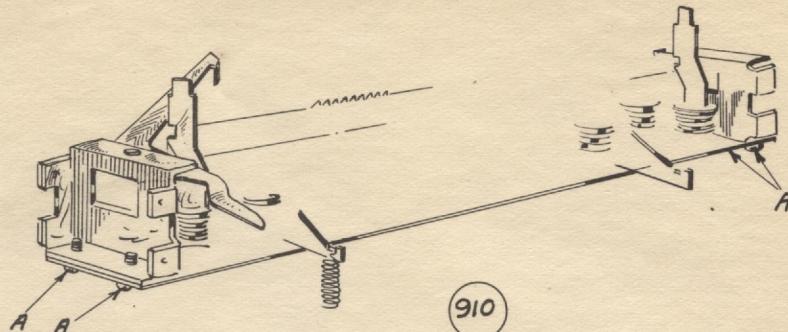
SHOWING RELATION OF THE PARTS TO EACH OTHER ON THE INSIDE OF R.H. SIDE FRAME.

907 DO NOT DISTURB THIS SCREW OR HOLDING PAUL UNIT OR IT WILL NEED ADJUSTING.  
PART BELOW MAY BE LIFTED OUT OF MACHINE, NOTE - THIS ASSEMBLY CAN ALSO BE REMOVED WITH OPERATION 904

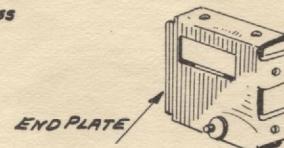
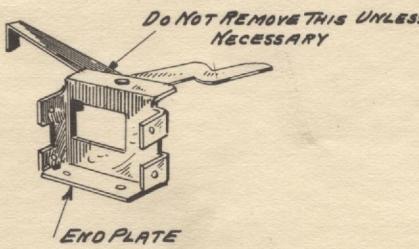


908 UNHOOK SPRING A AND REMOVE SCREWS B C D SCREW C IS ON UNDER SIDE  
DO NOT DISTURB SCREW E. SIDE FRAME MAY BE EASILY WITHDRAWN - LAY ASIDE.

## NOTES ON DISMANTLING THE MULTIPLIER SECTION.

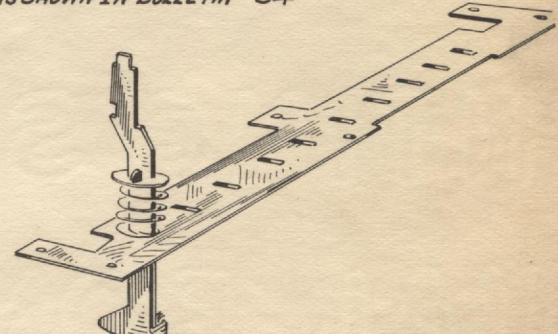


909 REMOVE THE 4 SCREWS - 2 ON EACH END.  
END PLATES MAY THEN BE REMOVED

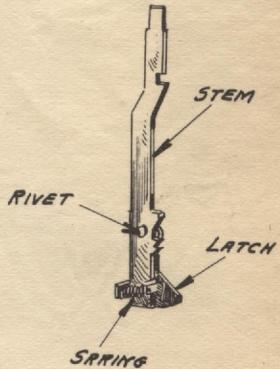
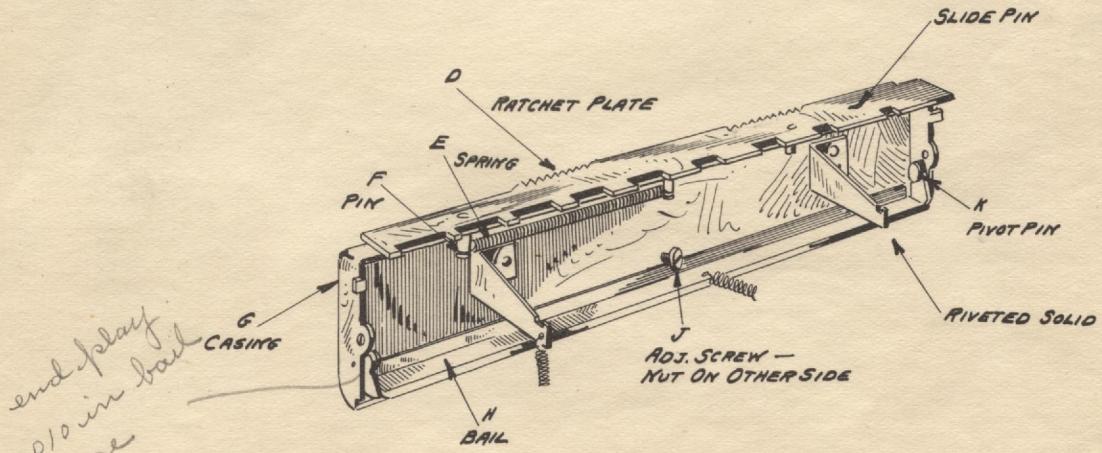
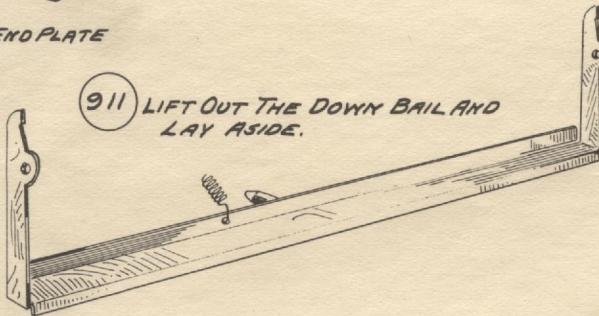


910

REMOVE THE BOTTOM KEYBOARD PLATE  
IF NECESSARY KEY STEMS MAY BE DISMANTLED  
AS SHOWN IN BULLETIN #34

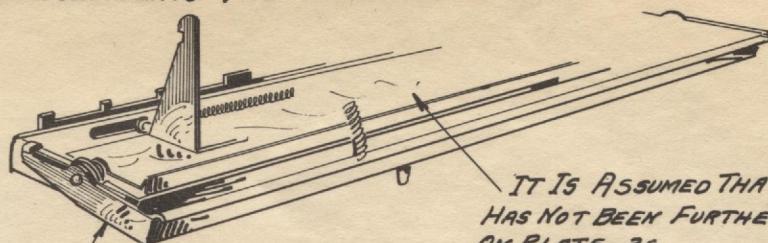


911 LIFT OUT THE DOWN BAIL AND  
LAY ASIDE.



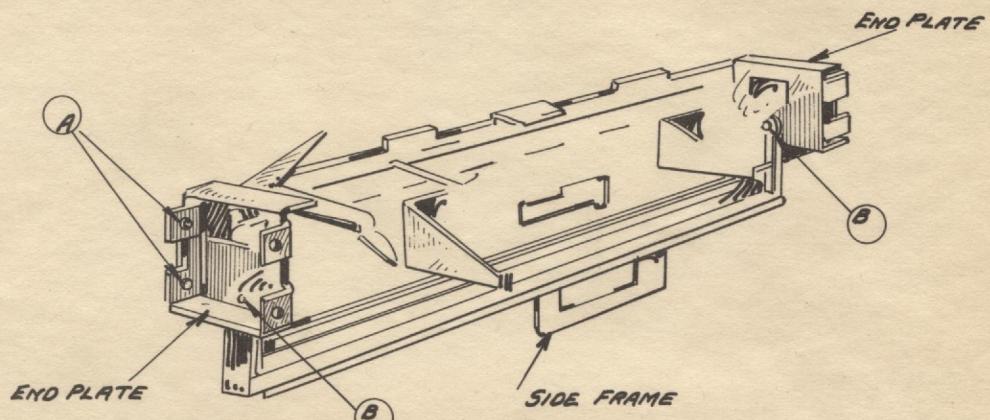
SHOWING THE REMAINING PARTS AND THEIR RELATION TO EACH OTHER.  
DO NOT DISMANTLE UNLESS NECESSARY.

## NOTES ON REASSEMBLING THE MULTIPLIER UNIT.



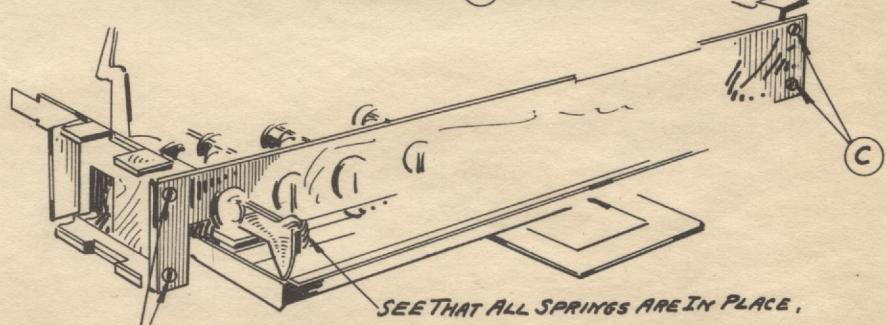
925

ASSEMBLE THE DOWN BAIL



926

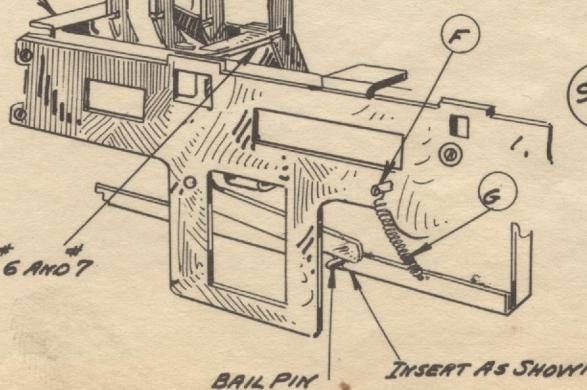
ATTACH END PLATES TO SIDE FRAME WITH SCREWS (A) AFTER PLACING THE BAIL CASE RIVETS (B) IN PLACE.



927 ASSEMBLE THE KEY STEM PLATE WITH SCREWS (C)

9 END

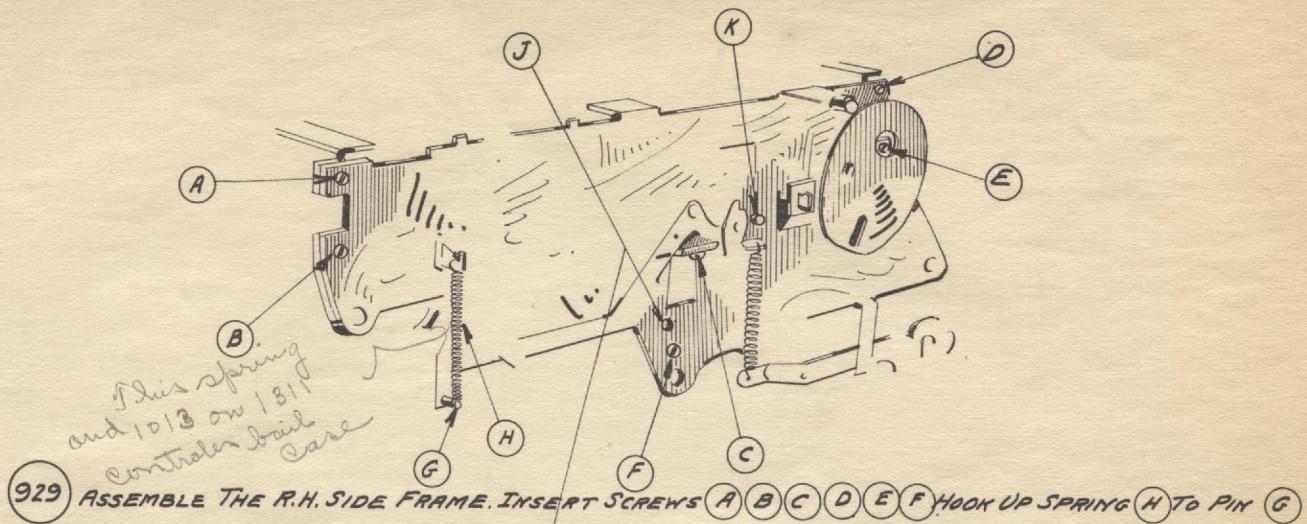
PLACE BETWEEN THE 6 AND 7 KEY STEM.



928

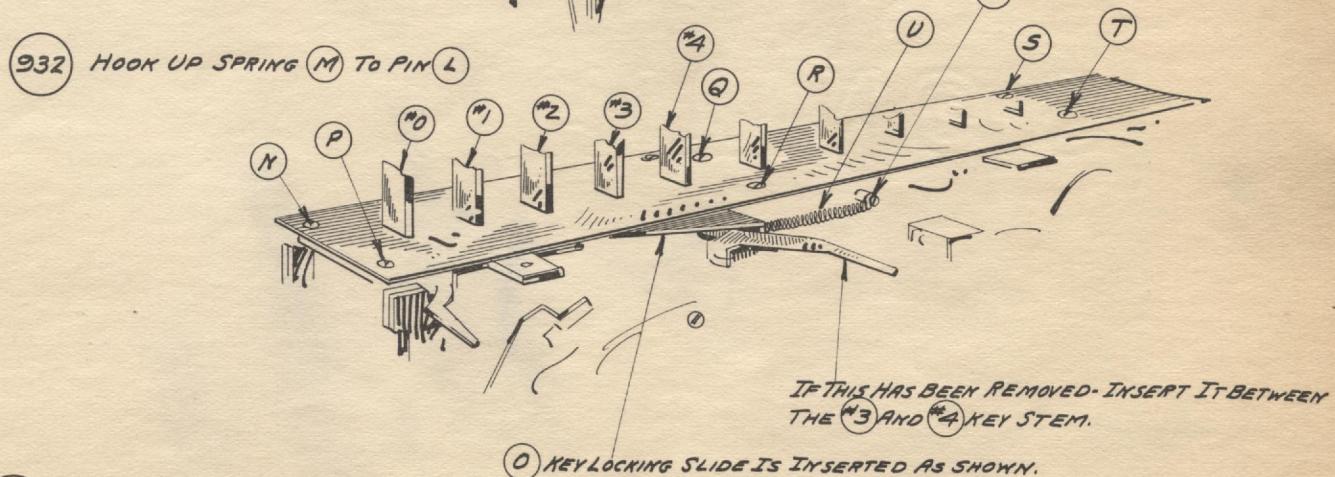
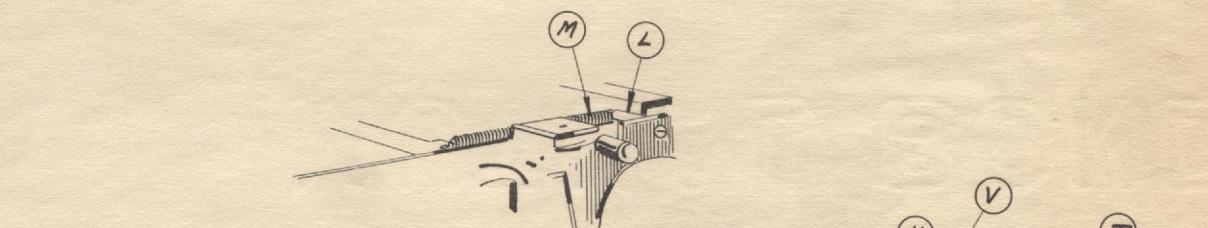
ASSEMBLE THE PACK SHIFTER  
BETWEEN THE 7 AND 6 KEY STEMS.  
HOOK UP SPRING (6) TO PIN (F)

## NOTES ON REASSEMBLING THE MULTIPLYING UNIT.

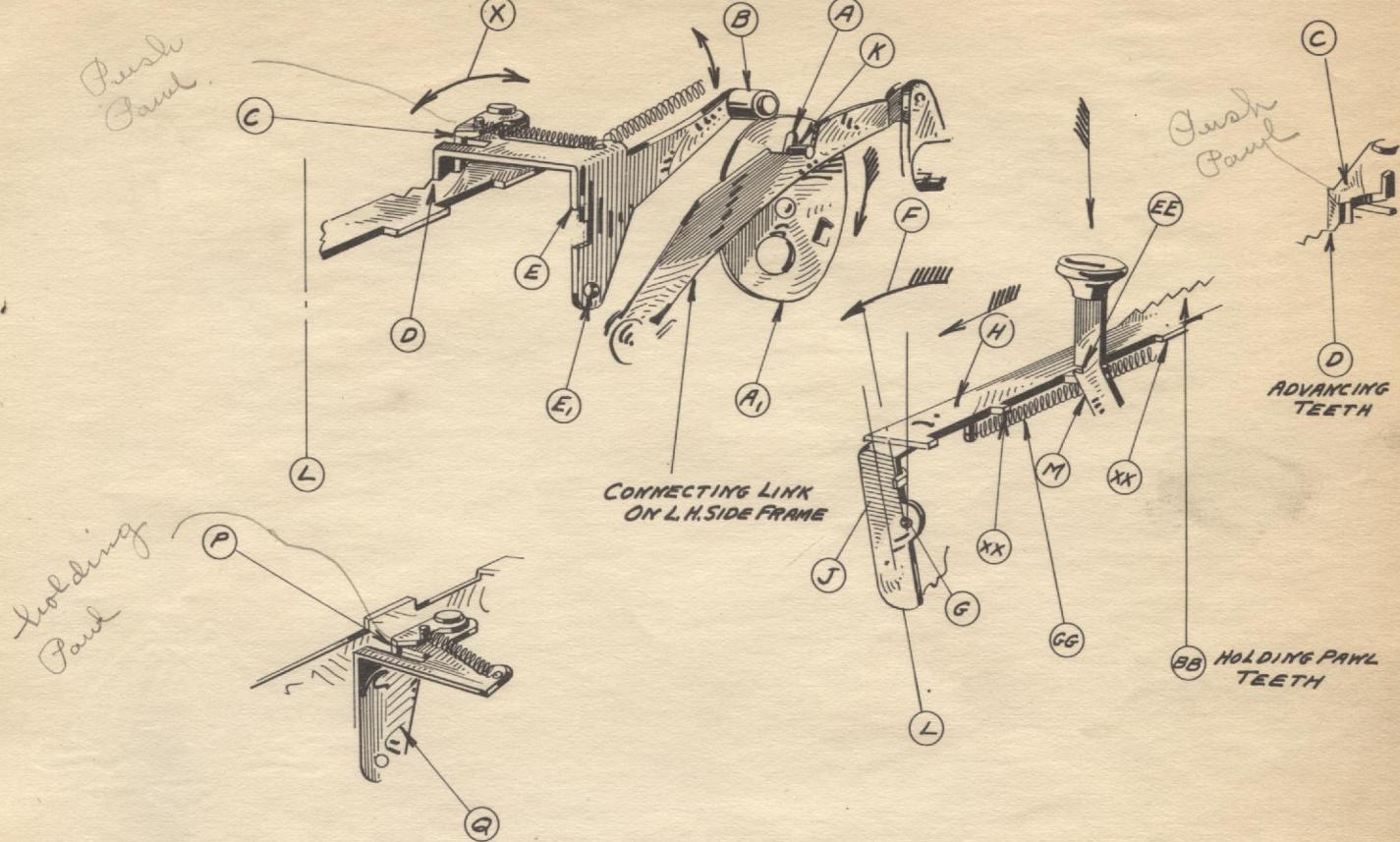


930 INSERT PIN J AFTER BAIL LATCH IS IN PLACE.

931 INSERT FULCRUM PIN K PUT ON RETAINING RING.



## SHOWING THE PRINCIPLE OF THE MULTIPLIER MOTION



THE PRINCIPLE OF THE MULTIPLIER IS AS SHOWN ABOVE - THE DEPRESSION OF A KEY STARTS THE MOTION - THIS MOTION CONTINUES UNTIL A PREDETERMINED COUNT RELEASES THE KEY WHICH HAS BEEN DEPRESSED. THIS RELEASE SETS INTO MOTION THE SHIFT AND STOPPING CYCLE.

IN DETAIL: THE CONNECTING LINK CONTAINS A PIN AT **K**, THIS PIN ENGAGES A SLOT **A** IN CAM **A**, CAUSING IT TO REVOLVE DURING THE OPERATION OF THE MACHINE. CAM **A**, HAS A CAM SURFACE ON ITS OUTER FACE AND ROLLER **B** ENGAGES THIS SURFACE. ROLLER **B** IS ATTACHED TO LEVER **E** AND AS IT RISES OR FALLS UPON THE CAM FACE, THIS LEVER ROCKS BACK AND FORTH [AS SHOWN BY ARROW **X**] FROM ITS FULCRUM POINT **E**. THIS ROCKING MOTION OF THE LEVER **E** CONTINUES AT ALL TIMES WHEN THE MACHINE IS IN ACTION, HOWEVER, UNLESS A KEY IS DEPRESSED THE PAWL **C** IS NOT IN MESH WITH TEETH **D** AND NO FUNCTION OF THE MULTIPLIER TAKES PLACE.

UPON THE DEPRESSION OF A KEY THE CAM SURFACE ON THE KEY STEM AT M SWINGS THE CASING J OVER AS SHOWN BY LINE L THIS CASING ALSO SUPPORTS THE TOOTHED SLIDE H AND AS THE CASING IS SWUNG, THESE TEETH D ENGAGE THE PAWL AND RECEIVE ITS MOTION. ON THE OPPOSITE SIDE OF THIS TOOTHED PLATE ARE LANDS XX THESE LANDS SLIP INTO THE NOTCH EE OF THE KEY STEM DEPRESSED BUT AS THE PAWL ADVANCES THE SLIDE THESE LANDS EMERGE AND RELEASE THE KEY AND THE RELEASE OF A KEY SETS INTO MOTION THE SHIFT AND STOPPING CYCLE.

EACH KEY IS SUPPLIED WITH A LAND ON THE TOOTHEOPPLATE BUT EACH LAND VARIES ONE SPACE IN WIDTH IE ONE FORWARD MOVEMENT OF THE SLIDE WILL LET THE KEY STEM FALL OUT OFF THE #1 LAND BUT IT TAKES EIGHT MOVEMENTS FORWARD BEFORE THE WIDER #8 LAND RELEASES THE KEY AND THE MACHINE SHIFTS AND STOPS

A HOLDING PAWL (P) IS PROVIDED. THIS PAWL (P) AND BRACKET (Q) ARE ATTACHED TO THE SIDE FRAME AND SERVE TO HOLD THE TOOTHED PLATE AT BB WHILE THE LEVER (E) RETURNS FOR THE NEXT ADVANCE OF TEETH (D). SPRING (G) WILL RETURN THE SLIDE TO ITS NORMAL POSITION WHEN KEY RELEASES.

SHOWING FUNCTIONS OF THE MULTIPLIER KEY STEMS

SHOWING NEUTRAL POSITION  
OF KEY STEMS AND  
THE UPWARD AND DOWNWARD KEYLOCKING BAILEYS.

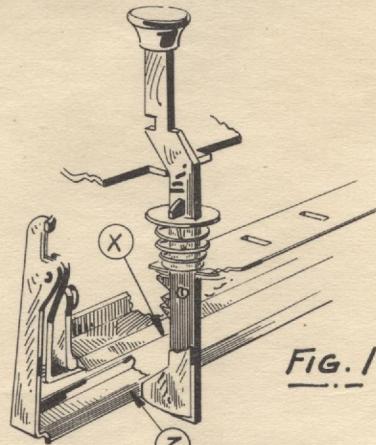
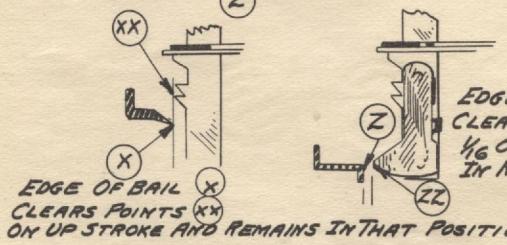


FIG. 1



EDGE OF BAIL X  
CLEAR POINTS ZZ  
ON UP STROKE AND REMAINS IN THAT POSITION

SHOWING DEPRESSED POSITION OF KEY STEMS, ALSO THE  
POSITION THE BAILEYS TAKE.

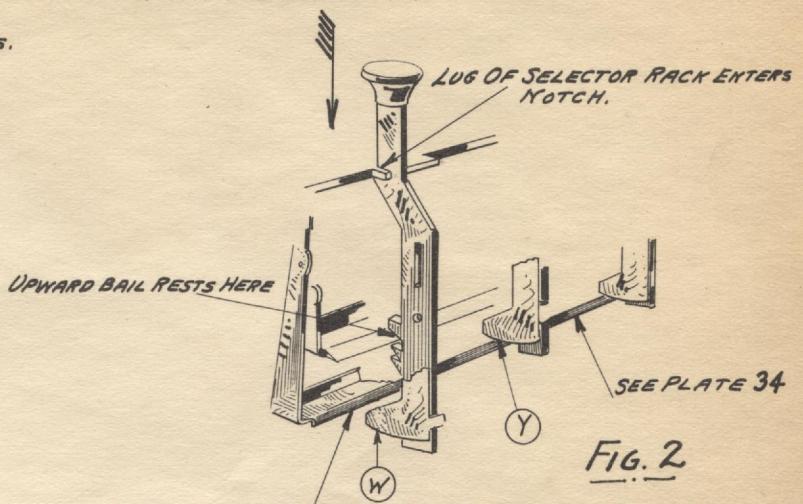
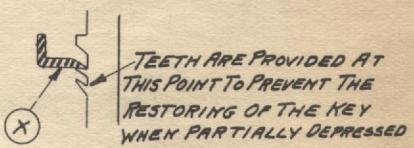


FIG. 2

DOWNWARD BAIL PLACES ITSELF OVER THE DEPRESSED KEY  
W AND UNDER THE UNDEPRESSED KEYS Y LATCHING AS IN  
PLATE 34 AND PREVENTING THEM FROM BEING DEPRESSED.



SHOWING FUNCTION WHEN ZERO KEY ALONE IS PRESSED.

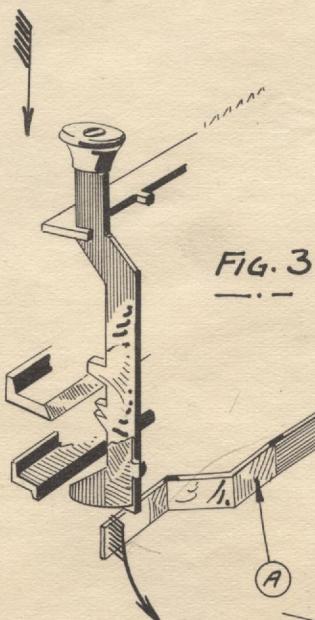


FIG. 3

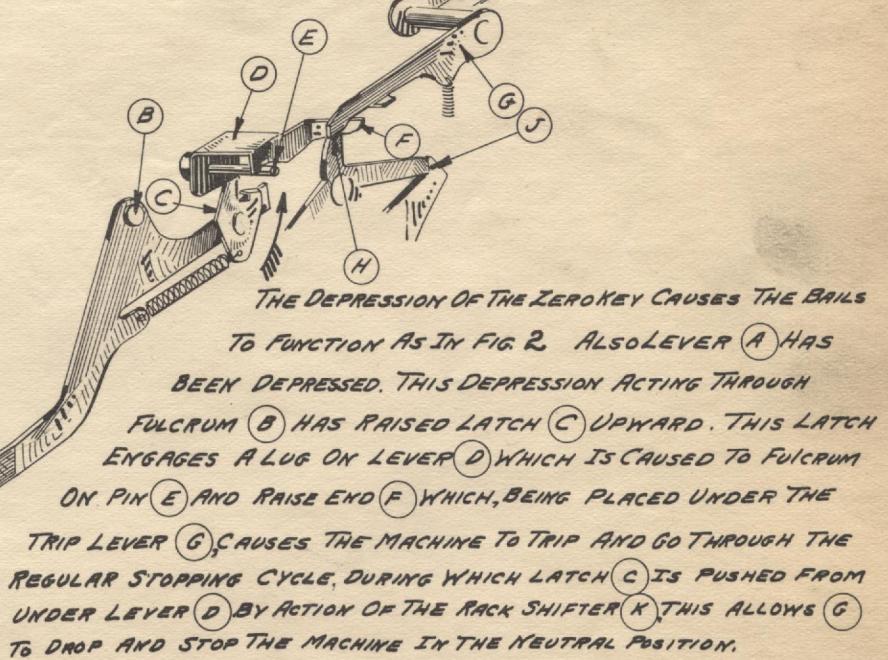
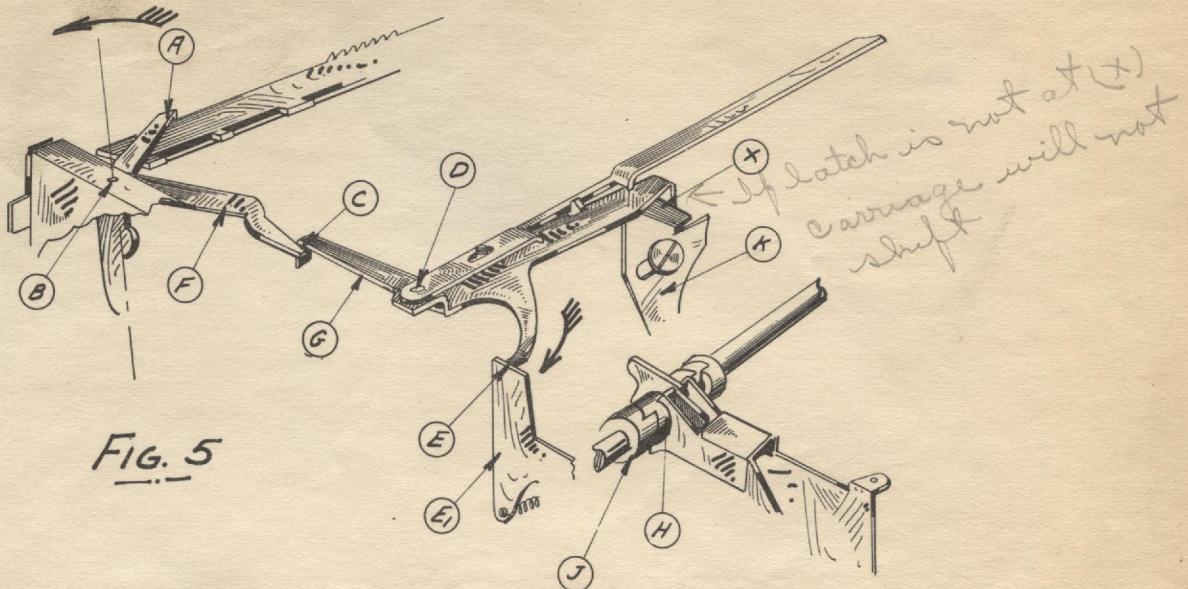


FIG. 4

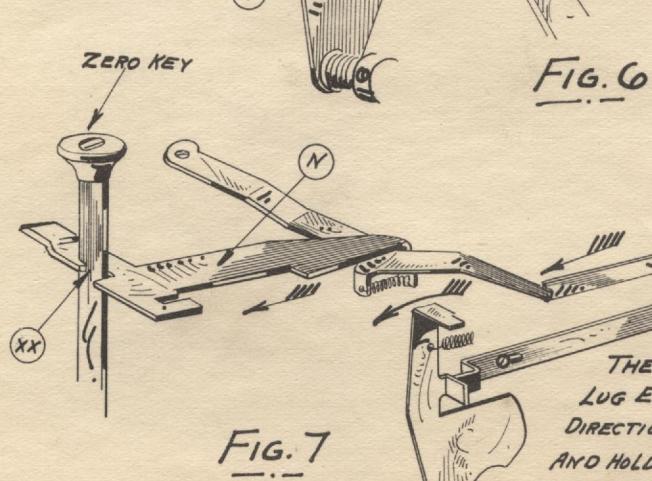
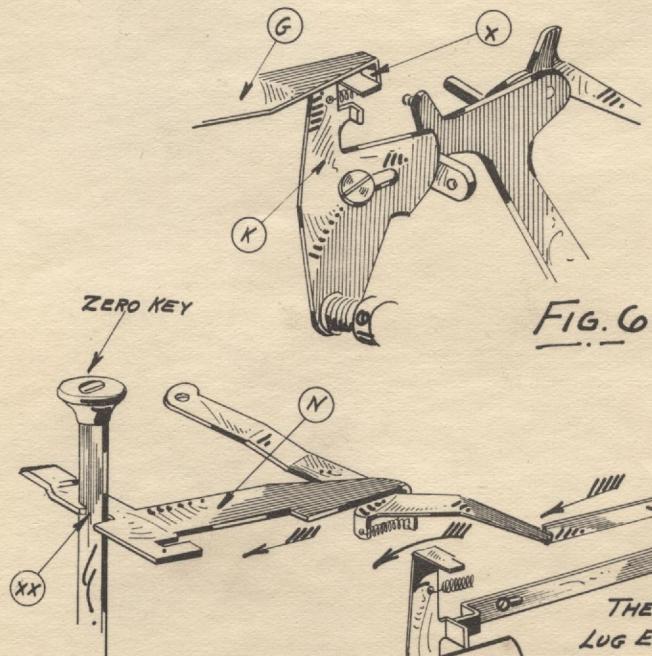
MOVEMENT IN DIRECTION OF ARROW PUSHES LATCH FROM UNDER LEVER D

PLATE 31  
SHOWING HOW THE CLUTCH CAMS FOR CARRIAGE SHIFT ARE ENGAGED.



THE SWING OF THE BAIL CASE IN DIRECTION OF ARROW CAUSES IT TO ENGAGE LEVER  $\textcircled{F}$  AT A. THIS LEVER IS FULCRUMED AT  $\textcircled{B}$  AND ENGAGES LEVER  $\textcircled{G}$  AT  $\textcircled{C}$  AS IT SWINGS. LEVER  $\textcircled{G}$  IS FULCRUMED AT  $\textcircled{D}$  AND POINT  $\textcircled{E}$  IS SWUNG IN DIRECTION OF ARROW, THEREBY CARRYING THE CAM SHIFTER  $\textcircled{E}_1$  FORWARD AND THE CAM CLUTCH  $\textcircled{H}$  INTO MESH WITH CLUTCH COLLAR  $\textcircled{J}$  ON SHAFT. THIS CLUTCH COLLAR  $\textcircled{J}$  IS USED WHEN MULTIPLYING.

ALSO THE SWING OF LEVER  $\textcircled{G}$  HAS CAUSED A LATCHING AT  $\textcircled{X}$ . THIS HOLDS THE CAM CLUTCH IN MESH UNTIL A TRIP OCCURS WHEN THE CYCLE STOPPING ARM IN STRIKING THE BUMPER, ALSO STRIKES THE LATCH  $\textcircled{K}$  AND DISENGAGES THE LATCHING AT  $\textcircled{X}$



AN UNLATCHING OF POINT  $\textcircled{X}$  ALSO OCCURS WHEN THE CARRIAGE REACHES ITS EXTREME R.H. POSITION, A LUG ENGAGES LEVER  $\textcircled{L}$  WHICH IN TURN PUSHES LEVER  $\textcircled{M}$  IN DIRECTION OF ARROW. THIS MOVEMENT SERVES TO UNLATCH  $\textcircled{X}$  AND HOLDS IT UNLATCHED. LEVER  $\textcircled{M}$  IS ALSO USED TO LOCK THE ZERO KEY WHEN THE CARRIAGE HAS REACHED THIS POSITION. LEVER  $\textcircled{N}$  SLIDES FORWARD AND SLOT  $\textcircled{XX}$  HOLDS THE KEY.

PLATE 32  
SHOWING HOW KEYSYSTEM MOVEMENT DOWNWARD EFFECTS THE LOCATOR ARM AND THE CLUTCH YOKE

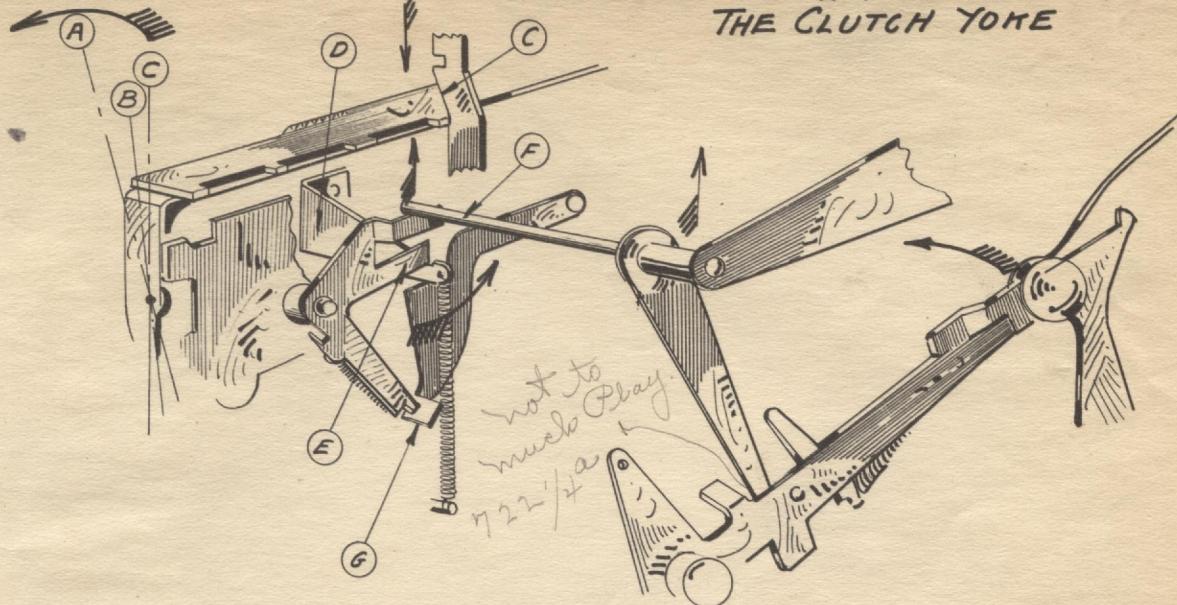


FIG. 8

SHOWING HOW THE DEPRESSION OF THE KEY SERVES TO LIFT UP THE LOCATOR ARM FROM ENGAGEMENT WITH ROCK LEVER. - THE CAM SURFACE C ON THE KEY SWINGS THE BAIL CASE FROM C TO A - TO THIS BAIL CASE IS ATTACHED AN ARM D. UPON THIS ARM D RESTS A LEVER E - AS D IS LIFTED, BY THE SWING OF THE CASE, THE LEVER E IS ALSO LIFTED, RESTING ON THIS LEVER E IS THE PIN F [DRAWN LONGER TO AVOID CONFUSION]. THIS PIN IS A PART OF THE L-H. SIDE FRAME MECHANISM AND RAISING IT SERVES TO LIFT THE LOCATOR ARM FROM ENGAGEMENT WITH THE ROCK LEVER. IT ALSO SETS INTO MOTION THE STOPPING CYCLE SHOWN ON PLATE #64 BULLETIN #34. THE LATCHING OF G TO E MAINTAINS THE CONDITION DESCRIBED.



FIG. 9

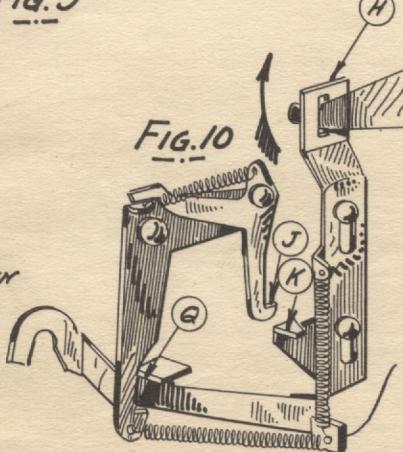


FIG. 10

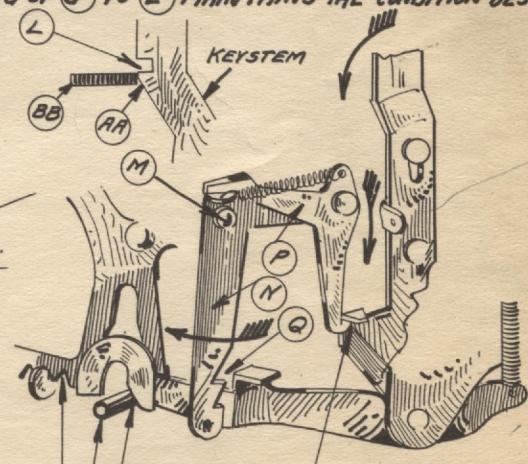


FIG. 11

THE BAIL CASE ALSO CONTAINS ANOTHER ARM LIKE D ABOVE, WHICH IS SWUNG UPWARD WHEN KEY DEPRESSION SWINGS CASE FROM C TO A

SHOWING HOW THE DEPRESSION OF THE KEY THROWS THE CLUTCH YOKE INTO ADDING. THE RAISING OF THE BAIL CASE ARM RAISES SLIDE H UNTIL A LATCHING OF J AND K TAKES PLACE AS AT XX. THIS LATCHING TAKES PLACE WHILE THE LADY OF THE SLIDE PLATE BB IS IN POSITION SHOWN AT AA. FURTHER DOWNWARD MOTION OF THE KEY STEM CAUSES THE PLATE BB TO ENTER THE SLOT L. THE FALLING INTO THE SLOT CAUSES A SLIGHT RETURN SWING OF THE BAIL CASE FROM A TO B. THIS DEPRESSES THE CASE ARM AND THIS DEPRESSION ACTING THROUGH THE LATCH XX PULLS LATCH P DOWNWARD AND LEVER N OUTWARD CAUSING UNLATCHING AT Q. SURFACE R UNDER SPRING TENSION STRIKES THE PIN S OF THE CLUTCH YOKE AND THIS MOTION CAMS THE YOKE TO ADDING POSITION WHERE IT IS HELD AT X BY THE CLICK.

PLATE 33  
SHOWING ACTIONS THAT TAKE PLACE IN MULTIPLIER DURING THE STOPPING CYCLE.

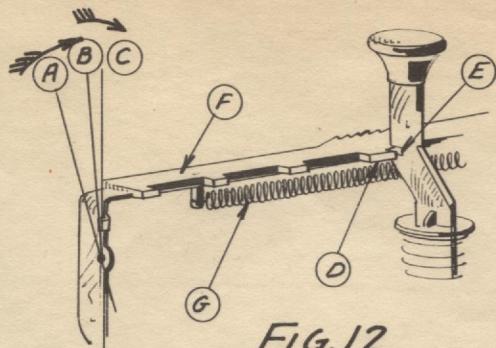


FIG. 12

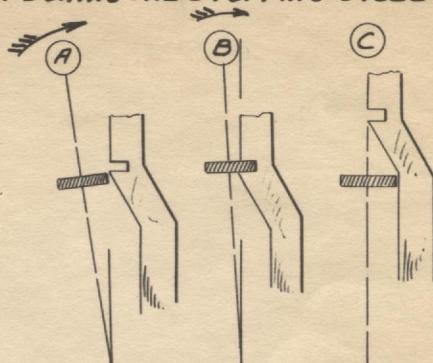


FIG. 13

BAIL CASE TRAVELED FROM (A) TO (B) [SEE NOTE UNDER FIG. 11, PLATE 32], AS THE SELECTOR RACK AND (D) PASSES THROUGH THE KEY STEM NOTCH (E). ANOTHER MOVEMENT OF THE BAIL CASE TAKES PLACE FROM (B) TO (C) OR THE NORMAL POSITION, DURING THIS MOVEMENT, THE KEY HAS ALSO BEEN RESTORED BY ITS SPRING, THE SLIDE (F) HAS ALSO BEEN RETURNED BY SPRING (G).

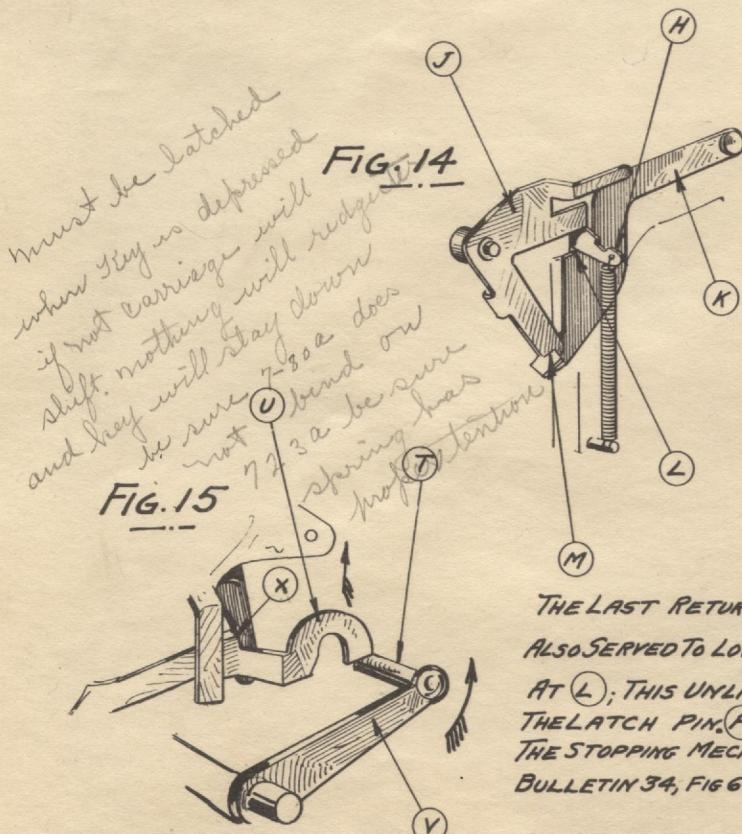


FIG. 15

FIG. 14

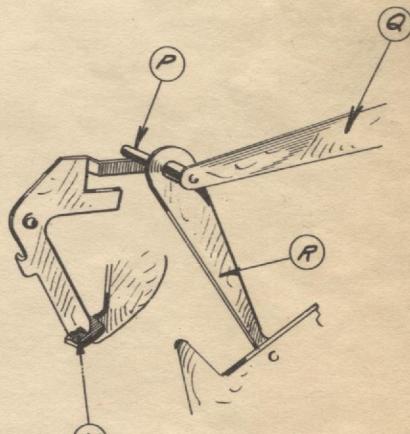


FIG. 16

THE LAST RETURN MOTION OF THE BAIL CASE FROM (B) TO (C) HAS ALSO SERVED TO LOWER END (H) AND UNLATCH (M) BY PRESSURE DOWNWARD AT (L); THIS UNLATCHING IS SHOWN AT (N) - NOT BEING HELD UP BY THE LATCH PIN (P) IS ALLOWED TO DROP AND CARRY DOWNWARD WITH IT THE STOPPING MECHANISM OF WHICH (Q) AND (R) ARE A PART [SHOWN ON BULLETIN 34, FIG. 64.]

THE REGULAR MOVEMENT OF THE STOPPING CYCLE ARM (V), CAUSES PIN (T) TO LIFT LEVER (U) UPWARD TO A LATCH AT (X) AND RESTORE THE CLUTCH YOKE TO NEUTRAL.

## SHOWING HOW THE LOCKING BAIL IS RELEASED AT THE COMPLETION OF THE STOPPING CYCLE

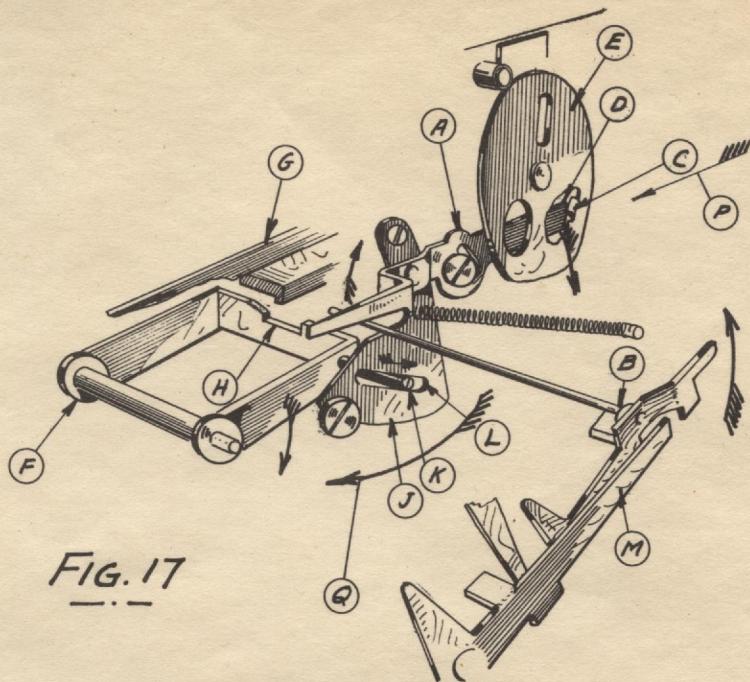


FIG. 17

THE STOPPING LEVER (M) IS SUPPLIED WITH A PIN (B) [DRAWN LONG TO AVOID CONFUSION]. THIS PIN (B) SERVES TO LIFT UP END OF LEVER (A), WHEN STOPPING LEVER IS LIFTED. WHEN LEVER (A) IS LIFTED, END (D) OF THIS LEVER IS DEPRESSED OUT OF THE WAY OF THE LUG (C) ON THE CAM (E). WHEN A STOPPING CYCLE OCCURS, THE LEVER (A) IS DROPPED BY PIN (B) AND END (D) GETS INTO PATH OF LUG (C). THIS LUG ON THE CAM RECEIVES A MOTION FROM THE REBOUND FROM THE BUMPER AND THIS MOTION IS USED TO PUSH END (D) IN DIRECTION OF ARROW (P). THIS MOTION CAUSES A MOVEMENT OF LEVER (J) IN DIRECTION OF ARROW (Q). PIN (K) TRAVELS DOWNWARD IN SLOT (L). AS THIS PIN IS A PART OF THE BAIL LOCK (F), IT CAUSES IT TO DEPRESS AND RELEASE THE BAIL (G) FROM NOTCH (H). A SPRING RETURNS THE BAIL TO NORMAL POSITION AND ALL KEYS ARE UNLOCKED.

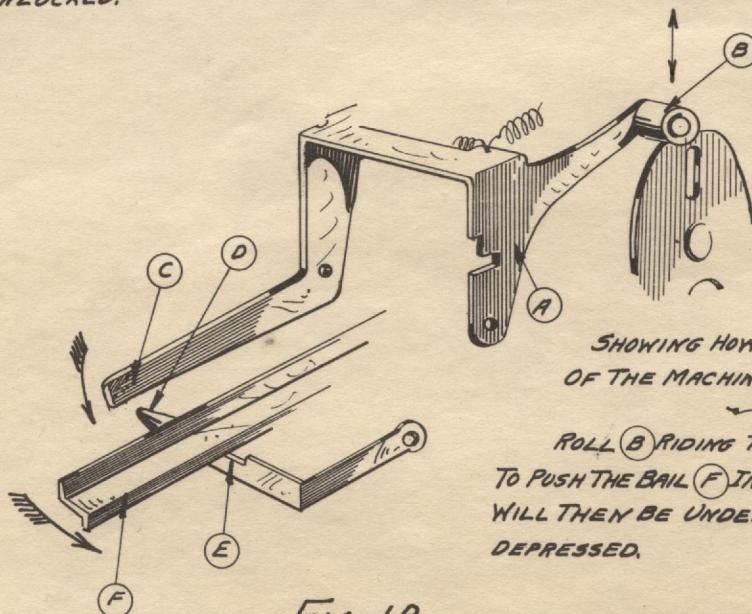


FIG. 18

SHOWING HOW THE FIRST MOVEMENT OF ANY OPERATION OF THE MACHINE AUTOMATICALLY LOCKS THE MULTIPLIER KEYS —   
 — ROLL (B) RIDING THE CAM, DEPRESSES END (C). THIS CAUSES PIN (D) TO PUSH THE BAIL (F) INTO NOTCH (H) IN DIRECTION OF ARROW. BAIL (F) WILL THEN BE UNDER THE KEY STEMS AND KEYS CANNOT BE DEPRESSED.

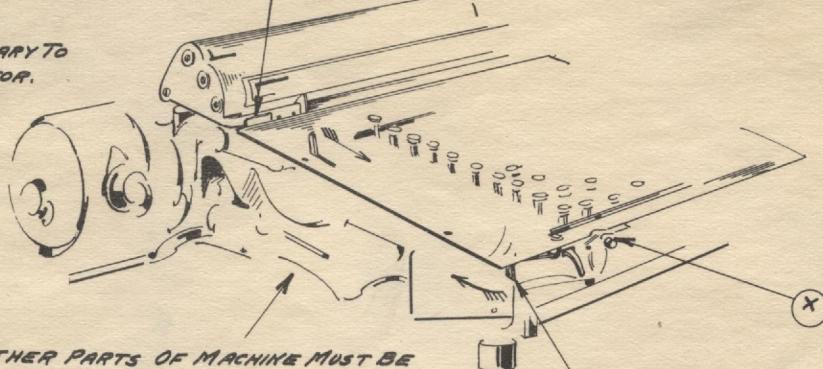
# HOW TO PROPERLY REPLACE THE MULTIPLIER INTO THE MACHINE

PLATE 35

THE MACHINE PROPER SHOULD BE IN THE CONDITION DESCRIBED

LOCATE THE CARRIAGE IN THE NEAREST TO THE LAST POSITION AS SHOWN.

IT IS NOT NECESSARY TO REMOVE THE MOTOR.

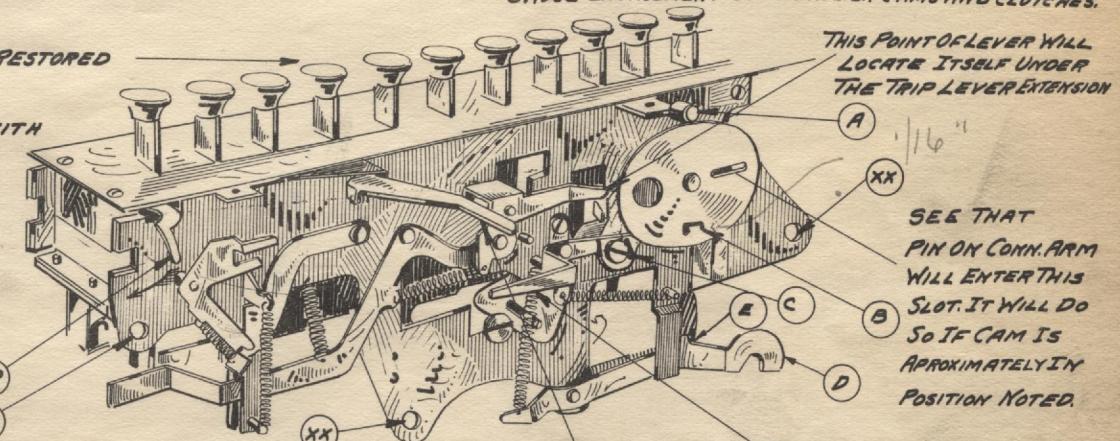


ALL OTHER PARTS OF MACHINE MUST BE IN NEUTRAL

PUSH LEVER IN DIRECTION OF ARROW THIS WILL CAUSE ENGAGEMENT OF MULTIPLIER CAMS AND CLUTCHES.

ALL KEYS MUST BE RESTORED  
NOTE.

TO RESTORE A KEY MOVE  
ROLL A UP AND DOWN WITH  
FINGERS UNTIL KEY  
RESTORES



THIS POINT OF LEVER WILL LOCATE ITSELF UNDER THE TRIP LEVER EXTENSION

SEE THAT PIN ON CONN. ARM WILL ENTER THIS SLOT. IT WILL DO SO IF CAM IS APPROXIMATELY IN POSITION NOTED.

THE MULTIPLIER UNIT MUST BE IN CONDITION SHOWN AND NOTED

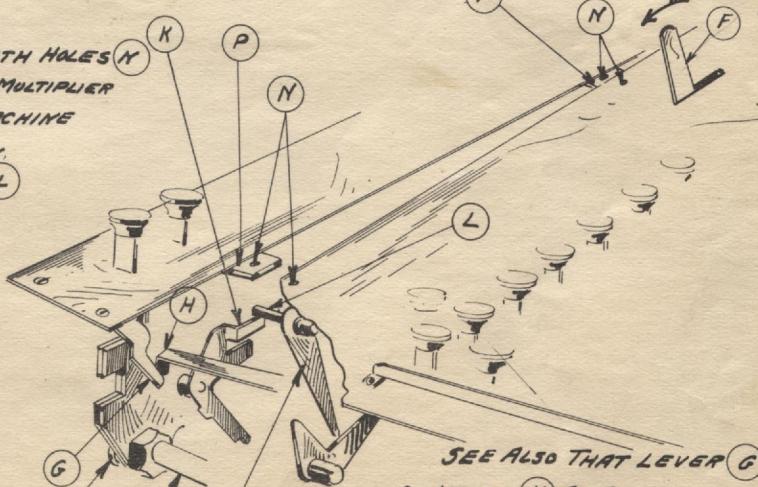
- 1 LUG B SHOULD REST AT END OF LEVER C
- 2 STARTING LEVER D SHOULD BE LATCHED AT E [TOP NOTCH.]
- 3 LEVER F TO BE PLACED IN DIRECTION OF ARROW.

THIS LEVER SHOULD REST ON PIN IN LOCATOR ARM AND WILL DO SO IF LEVER C IS HELD DOWN BY LUG B

THIS END ENTERS AN OPENING IN THE SIDE FRAME, IN POSITION TO ENGAGE THE ZERO KEY LOCKING LEVER.

LINE UP HOLES N IN LUGS P WITH HOLES K IN KEYBOARD TOP PLATE AS THE MULTIPLIER IS CAUSED TO APPROACH THE MACHINE

WHEN IN POSITION SHOWN,  
PLACE LEVER K UNDER PIN L

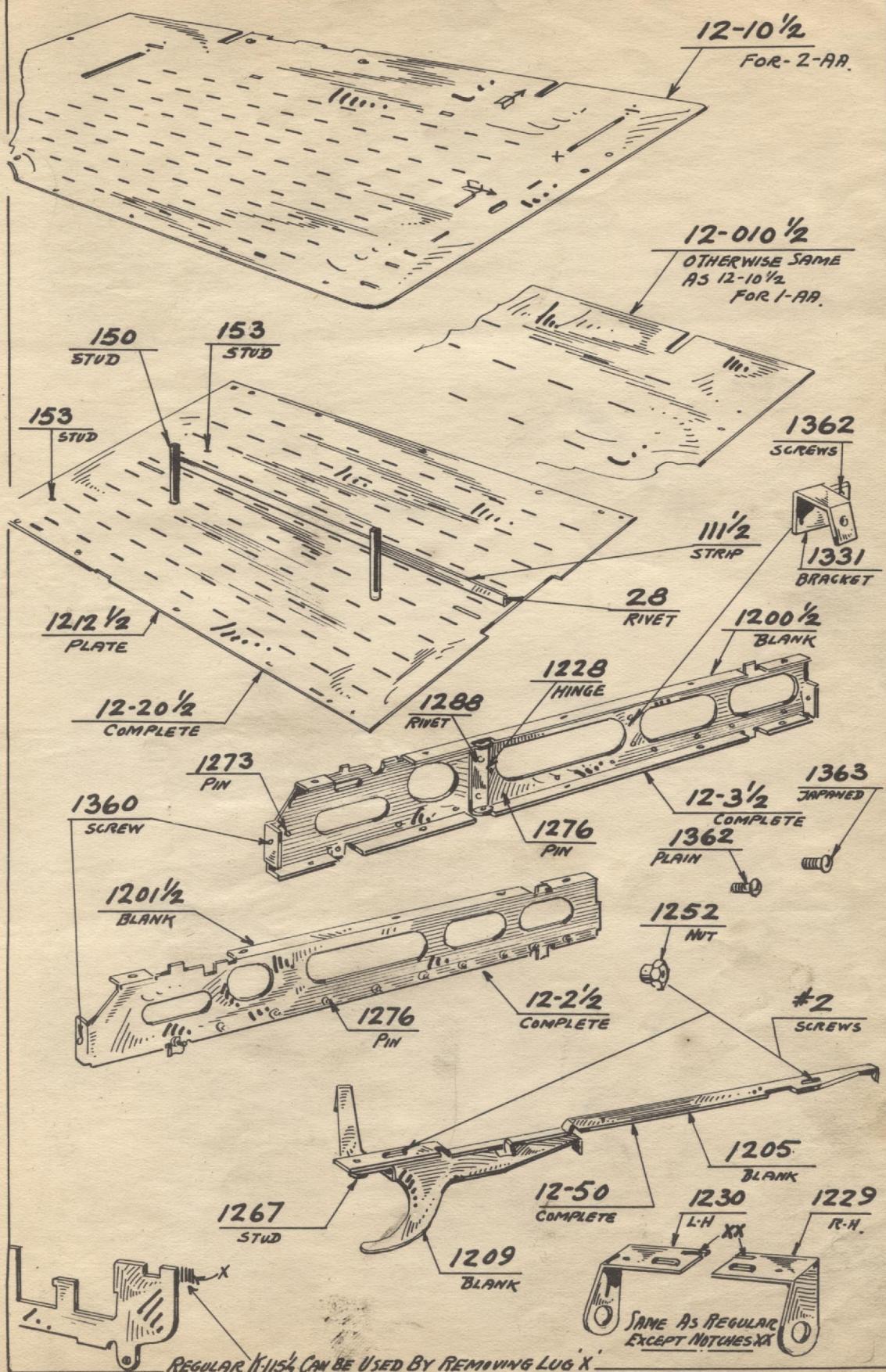


SEE ALSO THAT LEVER G IS IN FRONT OF LEVER H AS SHOWN.

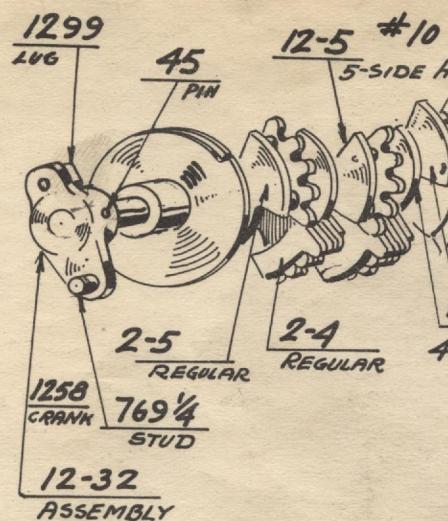
SCREWS N MAY NOW BE INSERTED. ALSO 3 SCREWS AND WASHERS P INTO STUDS Q IN SIDE FRAME AT XX.

## KAA MODEL-SERIES 1 AND 2-SUPPLEMENT E. GROUP 50

## KEYBOARD SECTION



## GROUP 51

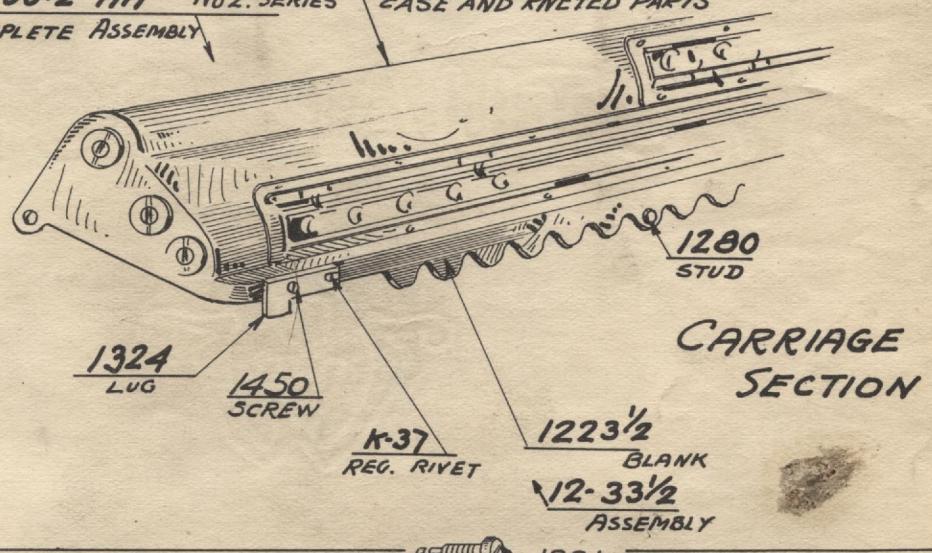
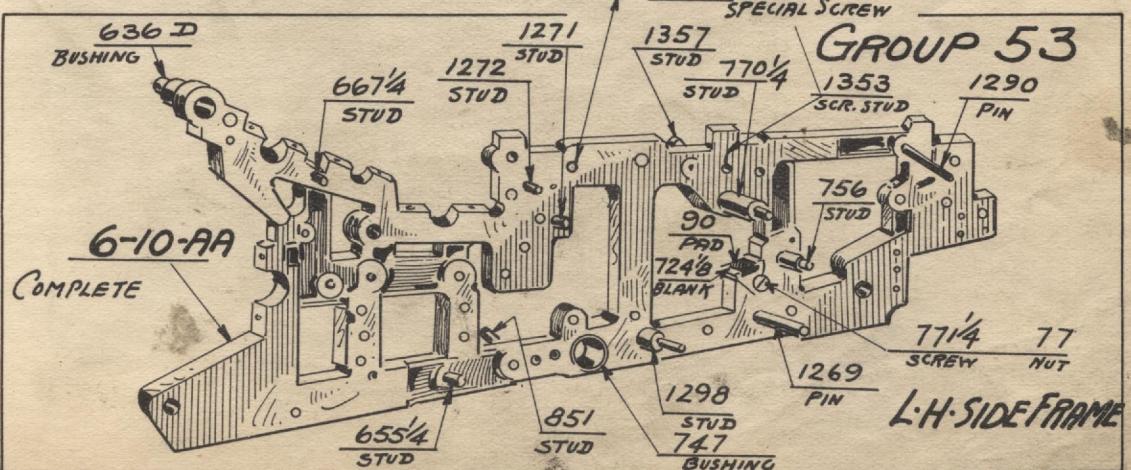


ASSEMBLY SEQUENCE  
OF SELECTING GEARS  
L-H TO R-H

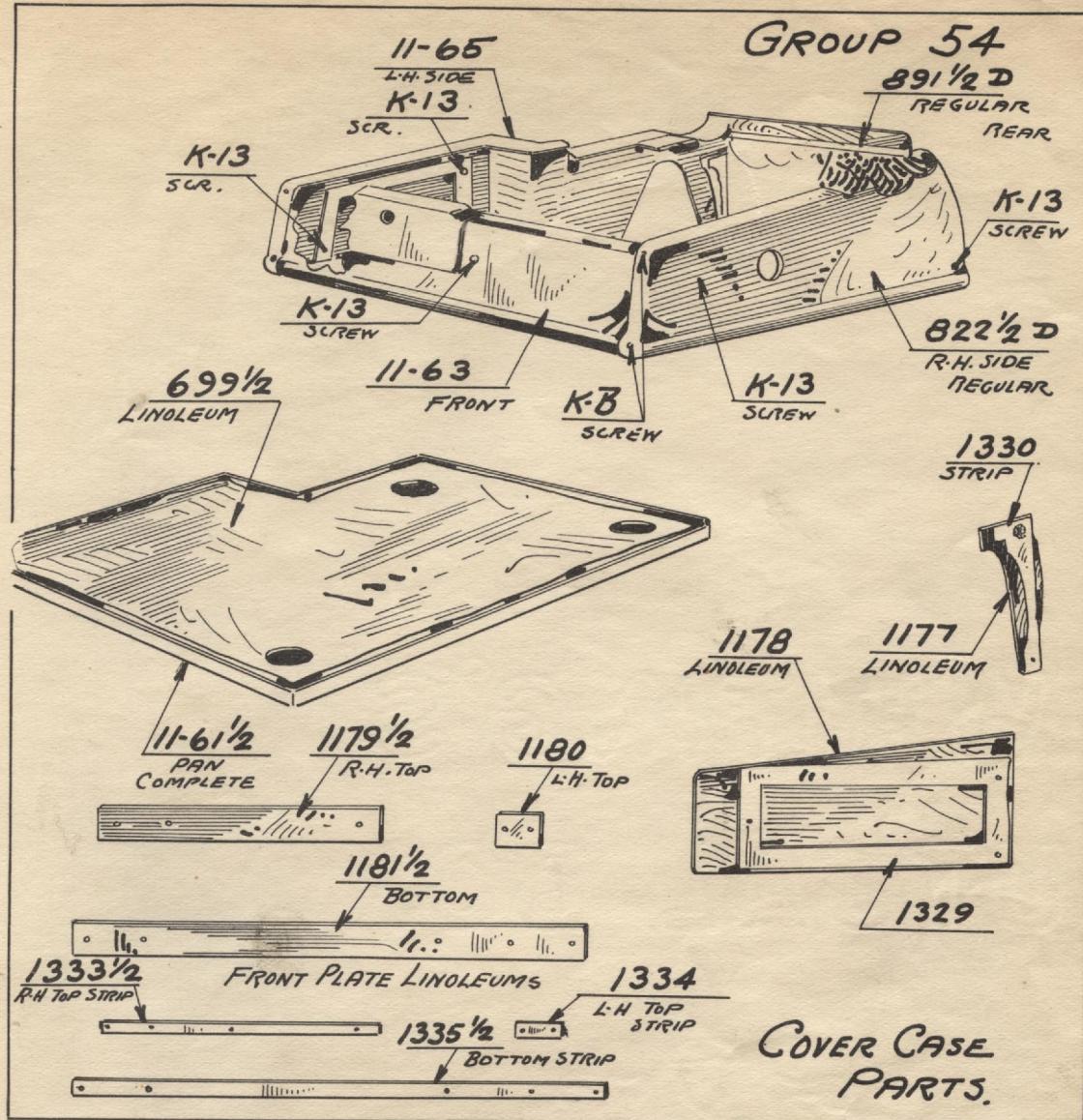
4-SIDE #9-#10-#8-#7-#6-#5-#4-#3-#2-#1  
5-SIDE #9-#10-#8-#7-#6-#5-#4-#3-#2-#1

## SELECTING GEAR SHAFT

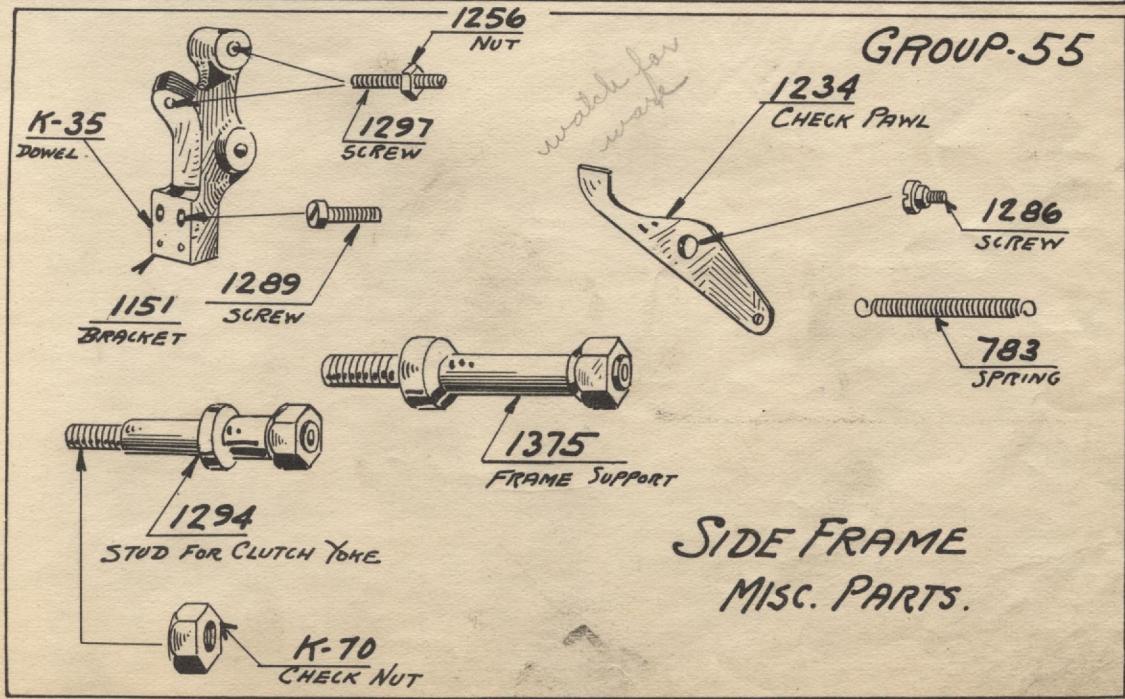
5-0100 1/2 AA = NO. 1. SERIES, 12-014 1/2 = NO. 1. SER. GROUP 52  
5-100 1/2 AA = NO. 2. SERIES 12-14 1/2 = NO. 2. SERIES  
COMPLETE ASSEMBLY CASE AND RIVETED PARTS

CARRIAGE  
SECTION

## GROUP 53

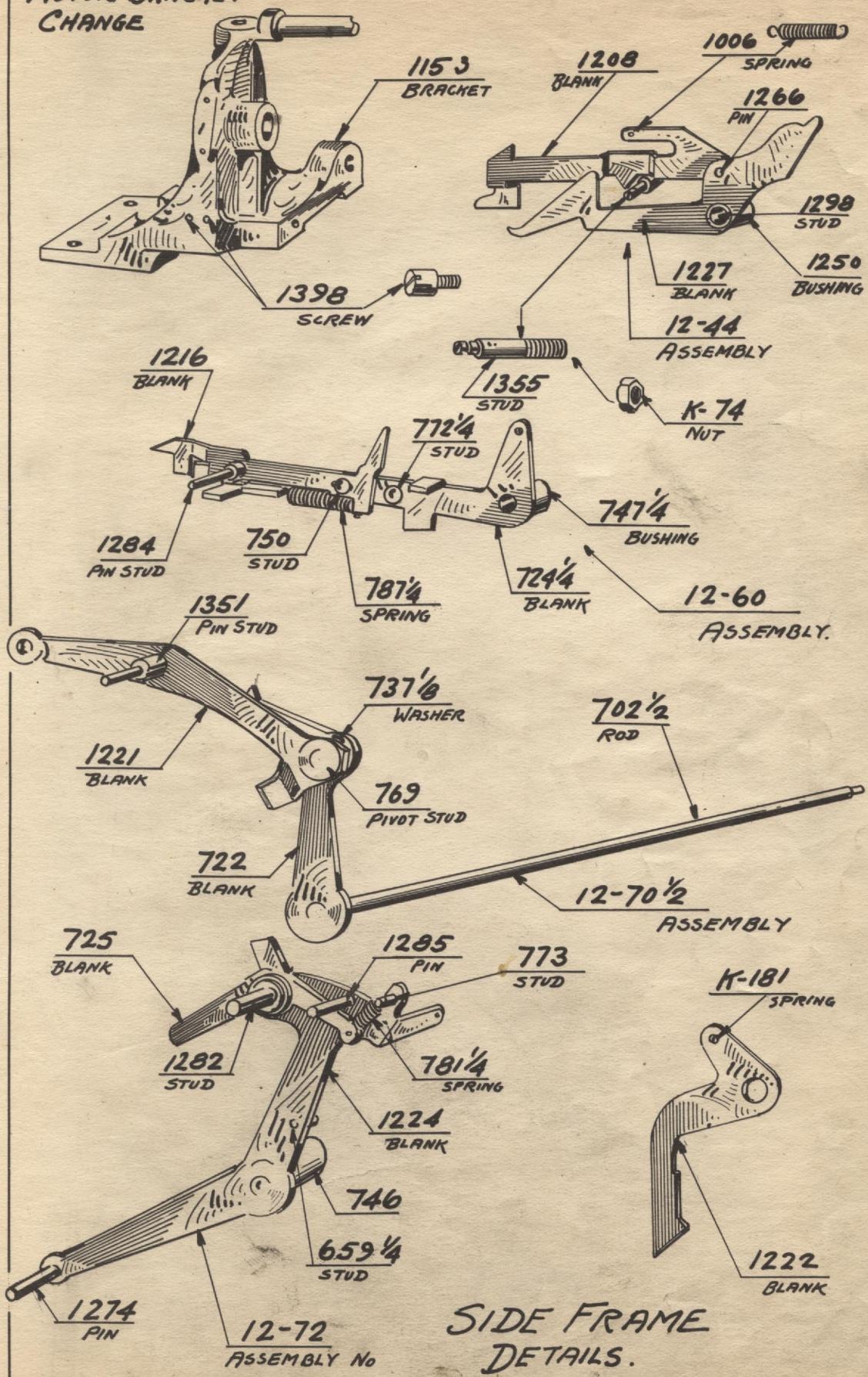


*Cover Case  
Parts.*

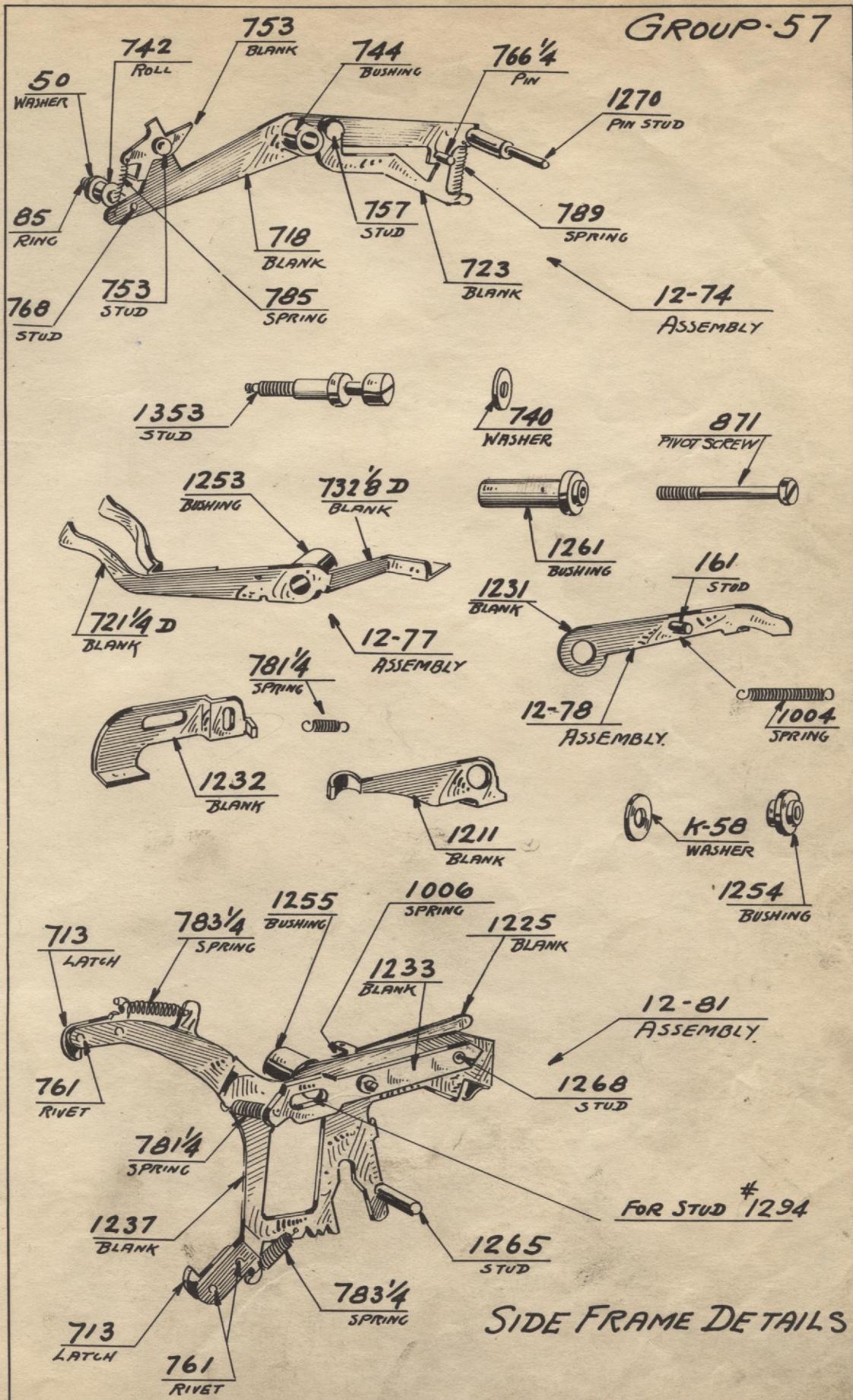


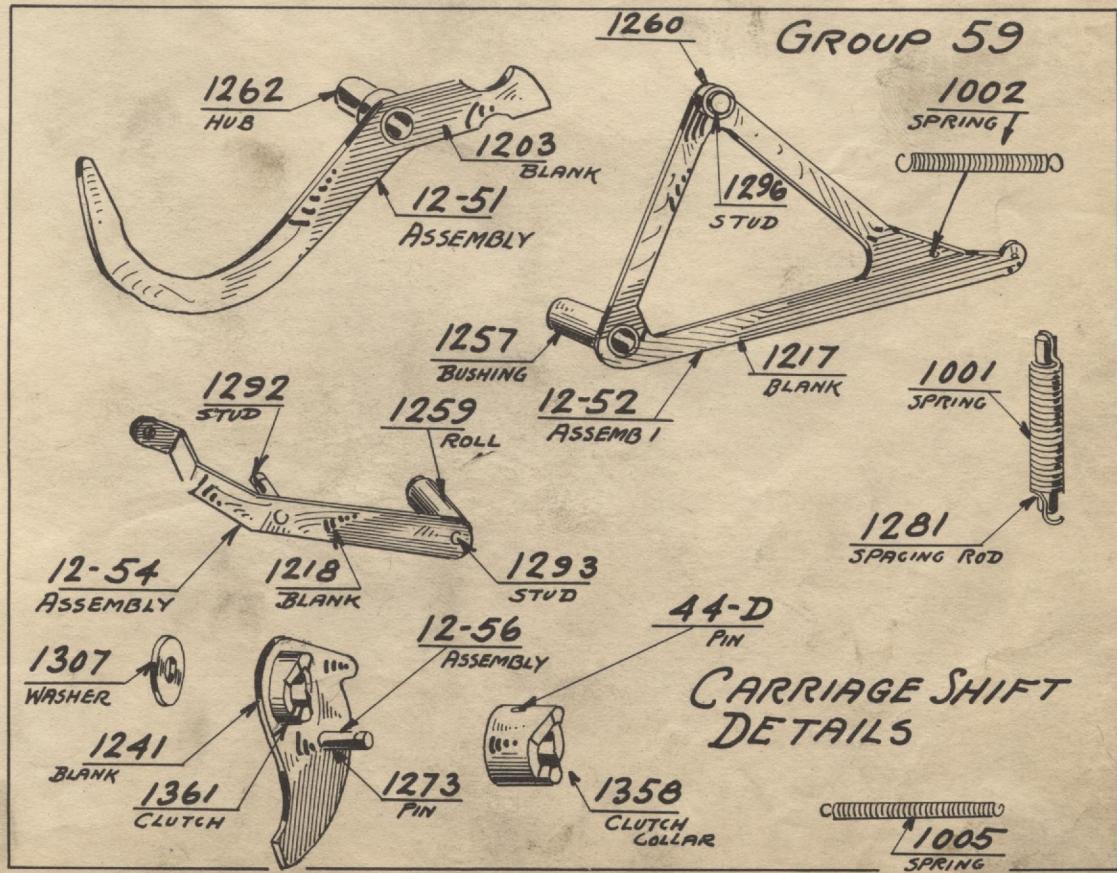
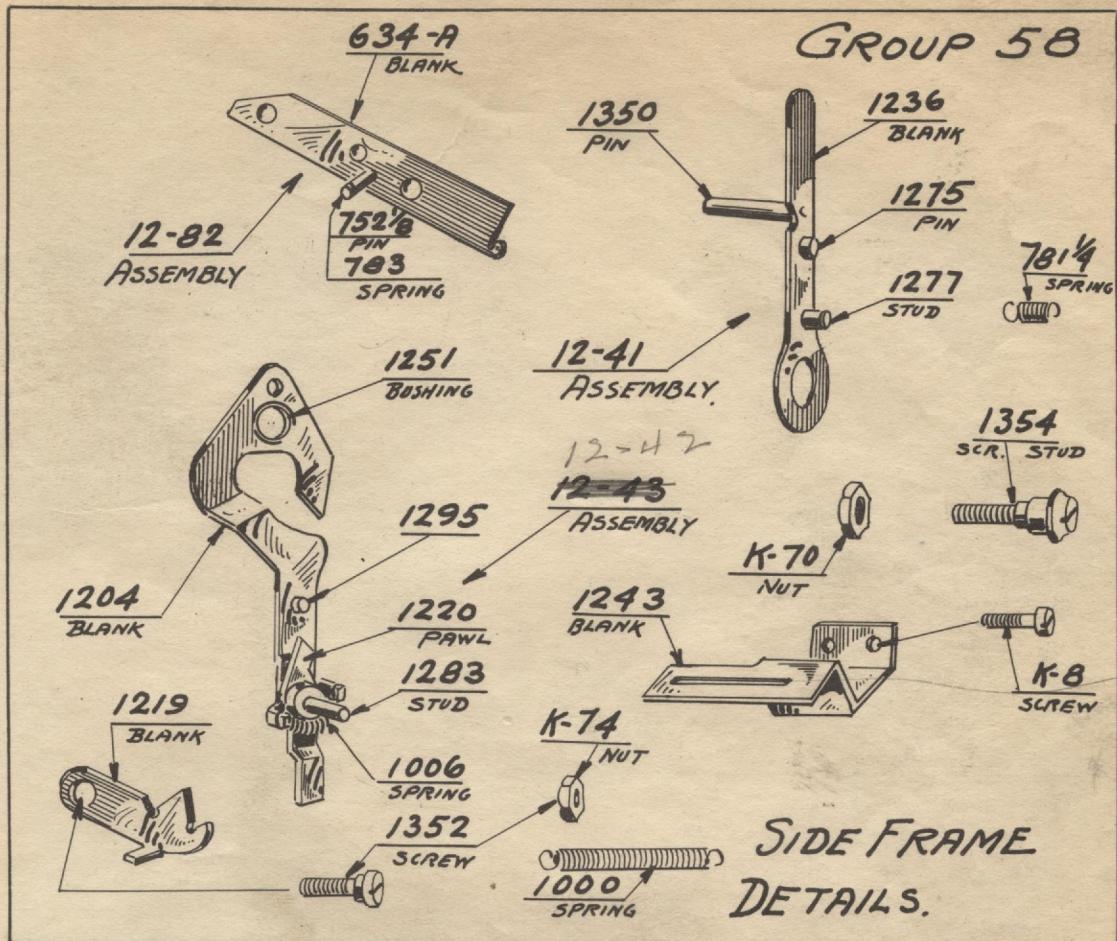
MOTOR BRACKET  
CHANGE

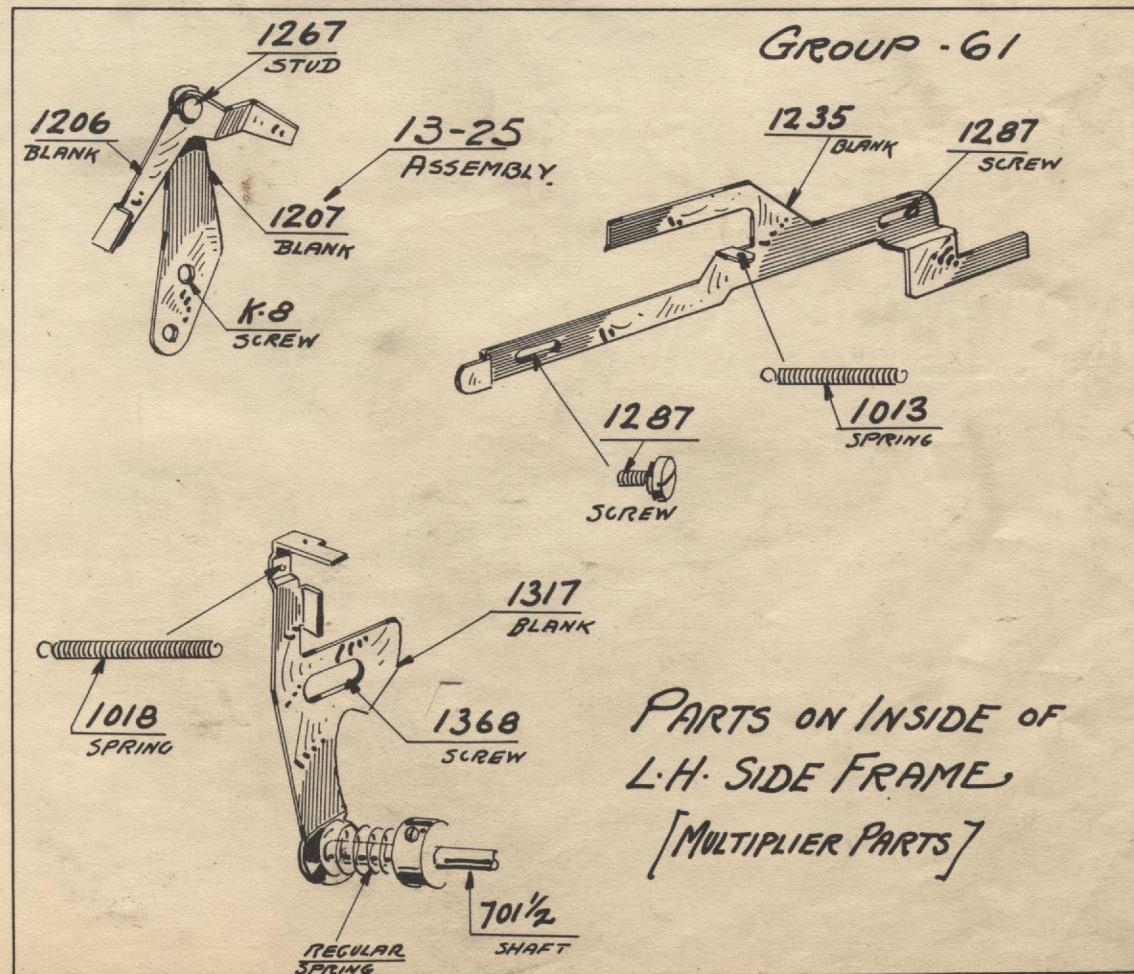
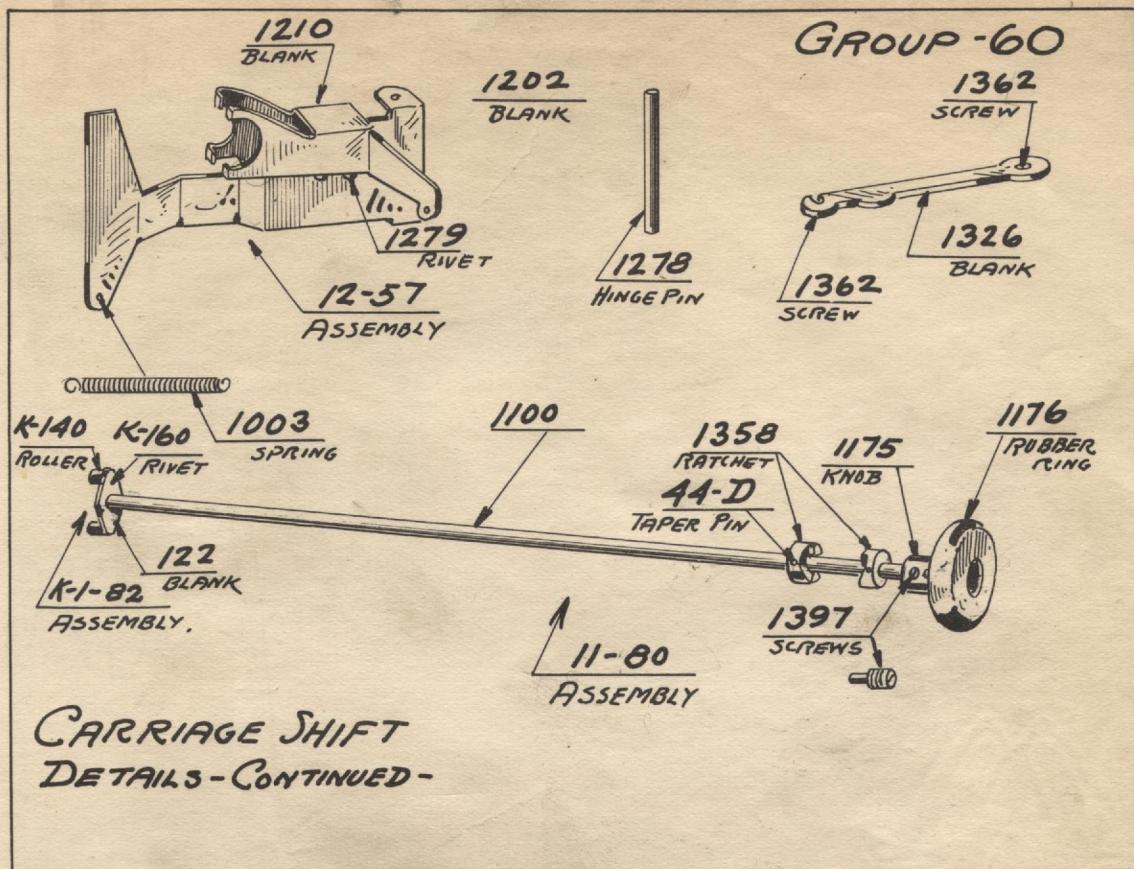
## GROUP-56



## GROUP 57







## SIDE FRAME DETAILS.

## GROUP 62

